

COMPUTERWORLD

INSIDE

Spotlight — The components for CIM are here. What's needed is the right strategy to put them to work. Center pullout section.

In Depth — Building a framework for data modeling. **Page 53.**

Offering a symbolic apology, the top two Toshiba Corp. executives resign following U.S. Senate vote to ban imports of Toshiba products as a result of controversial technology sale to the Soviet Union. **Page 2.**

Fiber-optic links to an 80386-based host highlight multuser product from a Mississippi start-up. **Page 6.**

Northern Telecom prepares to open its architecture to Bell companies intent on offering information services. **Page 10.**

Proposal to expand FBI's criminal data base worries civil liberties activists. **Page 15.**

Another Unix signal broadcast by IBM. **Page 8.**

Bewetti-Packard hikes prices of peripherals and Servers 1000 processors by an average of 2%. **Page 14.**

Fox Research scoops up in \$10 million purchase by Digital Communications Associates, which plans to use the 10-Net LAN products to broaden its market. **Page 65.**

OS/2 LAN pact lacks IBM seal

BY PATRICIA KEEFE
CW STAFF

NEW YORK — Microsoft Corp. and 3Com Corp. joined forces last week to position the OS/2 LAN Manager as "the open platform for advanced computer networking," but analysts said the strategy lacks one crucial component: an IBM endorsement.

The two vendors announced an agreement to jointly develop a market Microsoft's OS/2 LAN Manager, the next generation of the Microsoft Networks protocols (CW, June 29).

However, without IBM's blessing and significantly more technical detail on the LAN Manager, skeptical analysts were inclined to dismiss the joint venture as premature positioning.

A lot can happen in nine months, they said, noting that the OS/2 LAN Manager is slated to ship in the first half of 1988.

Microsoft and 3Com "are operating from the premise that the LAN Manager is already a standard and IBM will have no choice but to support it," said Thomas White, president of The Seybold Group, Inc., a market research firm in Santa Clara, Calif. But, he continued, "How can you call something that isn't even in the market's standard?"

The presidents of both companies — 3Com's William Krause and Microsoft's Jon Shirley — expressed confidence that the OS/2 LAN Manager will be accepted as a standard. "IBM's support would, of course, be overwhelmingly beneficial," conceded Krause, who nonetheless rejected arguments that IBM's backing was a prerequisite for success.

"OS/2 LAN Manager will be

Continued on page 4

Multitask option on Mac menu

Apple's Juggler could upstage OS/2 by skirting application rewrites

BY DOUGLAS BARNEY
CW STAFF

CUPERTINO, Calif. — Apple Computer, Inc. may beat both Microsoft Corp. and IBM to market with a large-memory microcomputer operating system that provides a form of multitasking and a group of enhanced data-sharing capabilities.

An extension, dubbed Juggler, to the Apple operating system will run the bulk of existing Apple Macintosh applications, according to several developers who are currently testing the product.

For OS/2, the operating sys-

tem due out from IBM and Microsoft next year, applications must be rewritten to take advantage of added capabilities. Existing IBM Personal Computer applications will run in OS/2's compatibility box, but they will not take advantage of multitasking and will run slowly, Microsoft has said.

Low cost/no cost?
Juggler, expected to ship later this year, is aimed squarely at current Macintosh users and is expected to be distributed aggressively. Both users and developers contacted last week said they believe, based on indica-

tions from Apple, that Juggler will be available at no cost or for a minimal charge.

The number of applications open at one time and the size of individual applications and data sets are limited only by the amount of random-access memory the machine contains, developers said. The Macintosh II, for example, is expandable to 8M bytes of RAM on its logic board, and more memory can be added using expansion slots.

The product will run on most versions of the Macintosh, including the Macintosh 512KE, Macintosh Plus, Macintosh SE and Macintosh II, according to a developer briefed by Apple. Because of the limitations of the Macintosh 512KE, Juggler is not expected to run effectively on that machine, the developer said.

Another developer said he found his Macintosh software to be "instantly compatible." The first developer cautioned, however, that

Continued on page 85

Competition thriving despite lessor buy-outs

BY CLINTON WILDER
CW STAFF

The increasing dominance of the computer leasing industry by a small number of large, acquisition-minded lessors will not slow competition or increase lease rates, according to corporate computer users.

The rapid pace of industry consolidation, evidenced by a series of acquisitions within the past year, is reshaping the industry into two tiers: very large lessors and very small, specialized

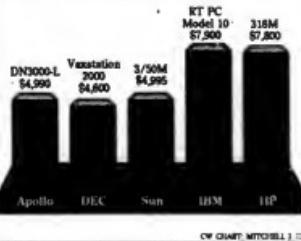
ones. But in contrast to users' negative impressions of major acquisitions in the hardware and software industries, computer lessors say the consolidation will maintain or even increase the leasing industry's traditionally fierce competition.

"Smaller firms that have been acquired are coming on more aggressively," says William Dean, director of technical services at Pepco, Inc., in Purchase, N.Y. "They can go after business they wouldn't have been able to be-

Continued on page 8

Apollo answers price challenge

Apollo last week joined DEC and Sun with entry-level systems priced below \$5,000. See story page 6.



Judge Greene wrong number for the Bells?

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — In three days of hearings last week on the future of the regional Bell holding companies, U.S. District Judge Harold H. Greene appeared highly skeptical of arguments that the Bell companies should be given complete freedom from the AT&T divestiture judgment.

The 1983 Modified Final Judgment prevents the Bell companies from entering the long-distance, manufacturing and information service businesses. But the regional holding companies and the Department of Justice are urging the court to remove those barriers on grounds that growing competition and enhanced regulation by the Federal Communications Commission make them unnecessary.

In the case of long-distance

Continued on page 85

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IN THIS ISSUE

Expanding its domain. Apollo targets CASE, technical publishing and finance markets with series of low-priced hardware platforms and PC connectivity options, including a mid-range DN4000 series and a 50% lower entry-level price for DN3000 line. Page 6.

NEWS

4 IBM ships first batch of high-end and mid-range 3090s.

5 Managers plan for ISDN implementations.

6 Sunriver links diskless workstations via fiber-optic cable to 80386-based micro.

8 IBM, Locus to jointly develop PS/2 operating system.

8 Fortune Systems sells business and is renamed.

10 Northern Telecom to open up its switch to Bell holding companies.

10 Hitachi says its supercomputers are faster than Cray models.

12 Harris extends H series supermainframes with multi-processor versions.

12 Proposal to toughen California computer crime statutes stalled.

13 Microsoft loses Taiwan piracy court battle.

13 IBM merges typewriter, computer in Personal Typing System.

14 M&D prep version of Millennium development environment for DB2 users.

14 HP ups prices on some storage, output devices.

15 FBI proposal to expand criminal information system called a privacy threat.

16 Orchid Technology claims victory as orders pour in for PS/2 board.

85 Excelan, Micom-Interlan licensed to develop products for VAXBLI.

85 Gupta distributed networking product ties vendors' SQL-based DBMSs.

86 Lotus develops Symphony software package for engineers, scientists.

SOFTWARE & SERVICES

23 European Unix OA package sweeps U.S.

23 Distributed DBMS use to grow, but not until 1990, study says.

23 Factory software for IBM, DEC machines revamped.



Serving out data modeling. Page 53.

MICROCOMPUTING

29 Rakes outlines Microsoft's user-interface strategy.

29 Soft-Sense utility puts the brakes on fast micros.

29 Software lets users match wits with business giants.

NETWORKING

41 Economy-minded MIS department budgets for first LAN installation.

41 VSAT growth rockets, finds new niches.

41 Software allows PCs to communicate via LU6.2, RJE.

SYSTEMS & PERIPHERALS

47 Miniature computer vendors expect DEC's invasion of market in 1988.

47 Edge claims dual-processor mini performs at 11 MIPS.

47 Memorex deals IBM, System/38 processors add-in cards.

Quotable

"God forbid you lose market share. It's cutthroat out there."

HARVEY KINZELBERG
CHIEF EXECUTIVE
THE MERITAN GROUP
ON THE COMPUTER
LEASING INDUSTRY

See story page 1.

MANAGEMENT

61 GTE unit adopts incremental backup.

61 Fannie Mae chief stresses ease of use.

61 CIM systems may spawn new industry.

COMPUTER INDUSTRY

65 DCA agrees to purchase Fox Research.

65 Micron plans to acquire Spectrum Digital for \$23M.

65 IBM creates unit to sell telecom wares in Europe.

65 IPL's memory products bring firm back to life.

EMPLOYMENT TODAY

70 Manufacturers seek programmers, analysts.

SPOTLIGHT

Manufacturing technology is advancing more quickly than our understanding of how to manage it.

Center pullout section.

IN DEPTH

53 Building a framework can simplify the tangled web of data modeling. By Sergio Faisolo.

OPINION & ANALYSIS

21 Kartes wants talking to do the talking.

23 Wouk takes another look at Cobol 85.

29 Zachman has a pocket full of miracles.

41 Chartoff explains X.25 networks' coming of age.

47 Connolly sees Godzilla meeting the ASCII terminal makers.

61 Mallach urges MIS managers to focus.

65 Wilder gives a midseason recap.

DEPARTMENTS

20 Editorial

62 Calendar

80 Buy Sell Swap

86 Inside Lines

NEWS

Toshiba fears boycott

Execs resign after Senate reaction to USSR sale

BY MITCH BETTS
CW STAFF

The top two executives of Japan's Toshiba Corp. abruptly resigned last week in hopes of appeasing angry U.S. legislators who voted to ban Toshiba imports because a company subsidiary sold advanced submarine technology to the Soviet Union.

Despite the resignations, the vote in the U.S. Senate and a threatened U.S. boycott of Toshiba products are jeopardizing "our continued existence in the American market," said Nobuo Ishizuka, chairman and chief executive officer of Toshiba America Inc., the firm's U.S. subsidiary, which sells a line of laptop computers and consumer electronic products.

While claiming that Toshiba Corp. had no involvement or awareness of the Soviet sale by Toshiba Machine Co., the resigned executives accepted "personal responsibility" as a move characterized by Ishizuka as the highest form of apology in the Japanese business world.

Senate votes to ban

The Senate voted Wednesday to ban Toshiba imports for at least two years; the House of Representatives is expected to vote on a similar provision to a pending trade bill. Toshiba Machine, which is 51% owned by Toshiba Corp., had previously acknowledged that it and a Norwegian firm sold computer-controlled milling machines that will enable the Soviets to manufacture quieter submarine propellers that will make it more difficult for U.S. monitoring equipment to detect Soviet submarines [CW, June 29].

In an interview with *Computerworld*, Ishizuka said that technically, Toshiba America could continue its microcomputer business because of an exemption contained in the bill. But he said it would not make good business sense to continue the U.S. operation if there is a consumer backlash against Toshiba.

The Senate bill contains an exemption allowing the importation of parts for U.S. production. Toshiba America's Information Systems Division imports parts from Japan and assembles the microcomputers at its plant in Irvine, Calif.

Recently, Toshiba has been hobbled by a punitive 100% import tariff on its 16-bit laptops [CW, April 27], which Ishizuka confirmed has caused some product shortages.

"The Senate bill, if it is enacted, will affect our business totally . . . all across the line. We have to consider how we can cope with the situation as a whole matter of our continued

existence in the American market," Ishizuka said. He said he hopes that last week's resignations of two top executives — Shouchi Saha, chairman, and Sugichiro Watari, president — of the Japanese parent firm will lessen the U.S.'s anger.

The resignations came shortly after the Senate passed an amendment, by a vote of 92 to 5, to the omnibus trade bill that would ban most Toshiba imports, thus reflecting congressional outrage over the damage to national security. Similar legislation has strong support in the House of Representatives, but the Department of State is opposed to the sanctions.

Designed to punish

Sen. Jake Garn (R-Utah) said the amendment was designed "to punish those companies and to send a message around the world that we are finally tired of talking about it. We wish to penalize them where it really hurts — in their pocketbook."

Garn's amendment requires the president to impose the import ban for a period of two to five years. It allows the president to limit the scope of the sanctions if the company or the Japanese government makes substantial improvements in export controls.

In addition, the measure prohibits Toshiba from making sales to U.S. government agencies, although there are exemptions for certain defense equipment. The sanctions affect Toshiba Corp. and its subsidiaries and affiliates.

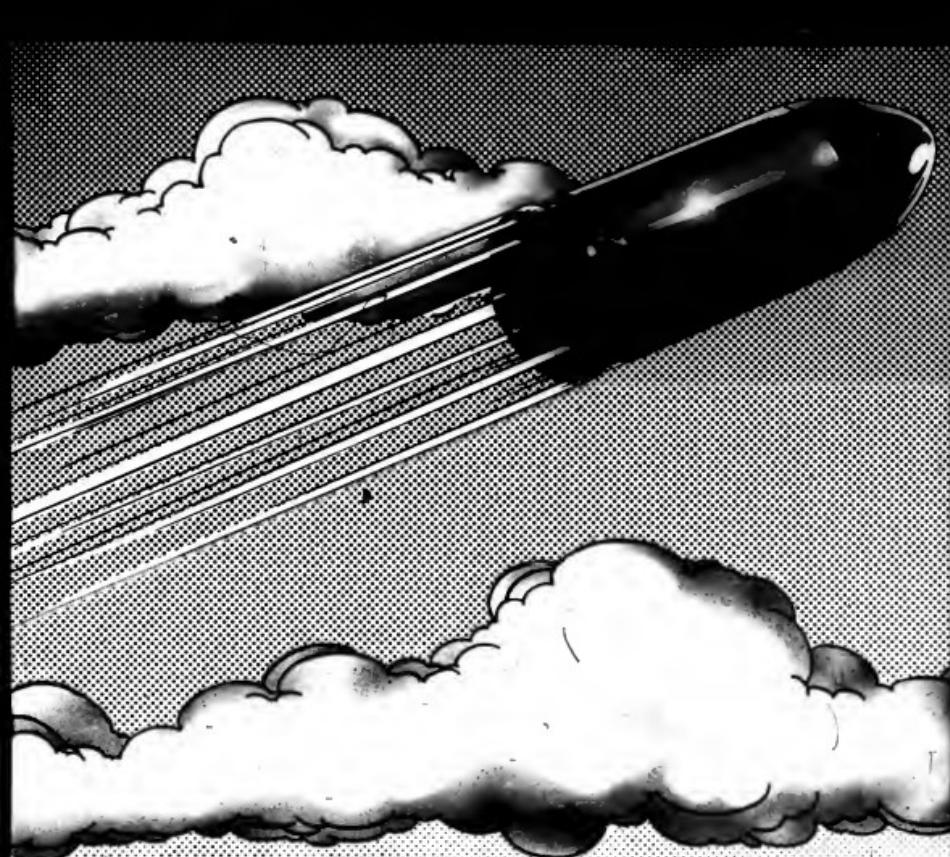
Cases for exemptions

The amendment states that the president may also grant exemptions in the following cases: imports shipped under contracts signed before May 1; spare parts and components essential to U.S. production; and routine service and maintenance of products already supplied to the U.S.

Garn acknowledged that the sanctions against Toshiba could be considered unconstitutional because they apply retroactively to export-control violations dating back to 1980. But he said if that part of the amendment is stricken, other parts of the measure would apply sanctions against future violations.

Sen. Richard C. Shelby (D-Ala.) had previously offered an unsuccessful amendment to ban Toshiba imports permanently, but Garn suggested that such an approach would probably put the firm out of business and harm U.S. interests. "It really is a matter of degree," he said.

"I would like to kick them out of the country permanently," Garn said. But the two-year ban "will have the impact we want: it will scare them to death."



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New models of 3090 head for user sites

BY JAMES CONNOLLY
and STANLEY GIBSON
CW STAFF

KINGSTON, N.Y. — The first shipments of IBM's newest high-end and mid-range 3090 models left IBM's factory here late last week, destined for user sites.

[IBM officials announced that the first 3090 Model 600E system was being shipped to the American Express Co. data center in Phoenix.

The Model 600E is a six-processor system that was introduced in January as IBM's most powerful machine. The Model 600E claims a performance rating of about 75 million instructions per second (MIPS).

IBM said the first 3090 Model 300E, a three-processor system, was shipped to the Aetna Insurance Co. in Hartford, Conn.

The Model 300E, also introduced in January, is rated at about .46 MIPS and fits in between the 3090 Models 200E and 400E in IBM's product line.

Sixty delivery

The deliveries occurred earlier than originally scheduled, according to IBM. When announced, the Models 300E and 600E were slated for third-quarter availability.

However, in June, IBM said the deliveries would begin by the end of that month. Field upgrades to the Models 300E and 600E also began shipping last week, IBM said.

George D'Andrea, executive vice-president of Melton Bank, said he has signed up to have his 3090 Model 400 upgraded to a 3090 Model 600E. That upgrade, which entails adding two

microprocessors and changing all the existing Thermal Conduction Modules in the Model 400, is in the process of being scheduled, DiNardo said.

The changeover, although a complex one, will take only one day and will be done on a weekend, he added.

Up to six-way processor

DiNardo said he had learned from recent discussions with IBM personnel that the 3090 will grow to no more than a six-way processor.

Another industry source said he had been told the same thing by IBM. Some observers have speculated that the 3090 will grow to an eight-way machine.

DiNardo said that going from four to six processors created significant software complexities that would make going to an eight-way machine extremely difficult.

"We're having a hard time going from four to six processors," DiNardo said. He added that this difficulty made it apparent to him that a six-way machine is the 3090's upper limit.

In separate documents for the Model 600E upgrade, DiNardo noted that "transportation charges had been eliminated by IBM." On June 16, IBM announced the new bidding procedure in what it called a "business simplification."

Last week, an IBM spokesman confirmed that the charges were eliminated entirely and not simply combined with other billing items. As a result, all IBM products that must be shipped are less expensive now, compared with one month ago, by the amount of the shipping charge, the spokesman said.

OS/2 LAN

FROM PAGE 1

to PCs what [IBM's] SNA is to mainframes," Krause said, referring to the Systems Network Architecture. He noted that 3Com has assigned 20 to 30 engineers to the project.

Analysts were significantly less optimistic. White called the announcement "the biggest burst of hoey I ever read in my life." He and other analysts compared the joint announcement to IBM's initial unveiling of the Token-Ring network amid a tidal wave of product promises. "In IBM's case, it didn't help them a lot. Users got very angry," White said.

IBM support doubtful

In fact, few analysts expect IBM will embrace Microsoft's LAN Manager, although it will develop similar software on its own. Although IBM remained silent on the issue, analysts said IBM will rely on its OS/2 Extended Edition instead. OS/2 Extended Edition is strategic for IBM, which refers to it as the lowest rung on the SAA ladder," said Barbara Lager, a principal with D. H. Brown Associates, Inc., in Tarrytown, N.Y. She was referring to IBM's Systems Application Architecture.

One Wall Street analyst who follows Microsoft noted the glaring absence of IBM representations from the announcement, in contrast to IBM's hearty endorsement of Microsoft's MS-DOS.

As for users, corporations are expected to standardize on OS/2, focusing in particular on OS/2 Extended Edition, which will feature proprietary Data Base and Communications Managers, said Davis Thomas, an analyst with Hambrecht & Quist, Inc. in New York. Microsoft and 3Com denied reports that they are working with Digital Communications Associates, Inc. on a Microsoft version of OS/2 Extended Edition.

Full of holes'

White echoed the disappointment of others who attended a briefing session on the OS/2 LAN Manager. "They couldn't do a technical briefing because they don't know what they are doing yet," he said. The OS/2 LAN Manager, he charged, "is a nice marketing concept, but it's full of holes."

According to 3Com, the project is on schedule.

3Com also announced 3+ Open, the next generation of its 3+ network software, and announced a series of hardware upgrades migrating users of its file servers to Intel Corp.'s 80386 chip.

Under the nonexclusive agreement, 3Com will aid LAN Manager development in several areas, including:

* Protocols. 3Com will provide the underlying protocol support, including support for IBM's NetBIOS, Xerox Corp.'s Network System, XNS Open Systems Interconnect and 802.3.

* Network-specific applications and software tools. Microsoft and 3Com will jointly develop distributed network applications, including a windowing interface, distributed data base services and extensions to allow standard programmatic interfaces for message handling, directory and gateway services.

* Security. Security and network administration capabilities will be boosted significantly to include built-in error logging, audit trails, remote program executions and network statistics.

Not planned is support for IBM's NetView under the LAN Manager, although LU6.2 support is being considered. Analysts said the OS/2 LAN Manager must support key IBM connectivity schemes such as Netview, LU6.2 and Advanced Peer-to-Peer Networking.

Separately, 3Com will merge the LAN Manager with its 3+ software. Also available in the first half of 1988, 3+ Open will feature MS-DOS, OS/2 and Apple Computer, Inc. Macintosh integration.

3Com will provide upgrades to 3+ Open for current users and announce a series of hardware upgrades for current users of 3+ software and 3Server file servers.

3Com is not the only network vendor adding OS/2 LAN Manager support to its software. Novell, Inc. may well remain a significant factor in the race for control of the network market.

Not yet a has-been

Because IBM's support is still uncertain, some analysts were not willing to dismiss Novell, a major developer of network software and the acknowledged leader in the PC network market, as a has-been. By the time the LAN Manager ships in the first half of 1988, Novell will have a formidable installed base of more than one million users, claimed Craig Burton, Novell's vice-president of corporate development.

Burton took exception to comments by Microsoft and 3Com that Novell will find it difficult to provide support for the LAN Manager. "They don't understand what it is that we do," Burton added. While it is true that Novell will not license the LAN Manager, Novell does plan to support both OS/2 and the LAN Manager extensions, Burton said.

If Novell can successfully provide this support, some analysts said it will be better positioned than the OS/2 LAN Manager by providing users with the widest range of support for the jungle of existing and future networking alternatives.

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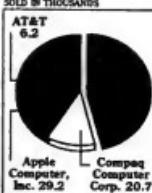
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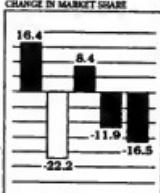
IBM comes on strong

Surveys of computer stores indicate strong demand for IBM products in May; the PS/2 Model 30 accounted for one-third of IBM's PC sales

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May vs. April, Percent Change in Market Share



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CHART

Managers hatch plans for still-distant ISDN

Although widespread implementation is still years away, show-goers prep for network's use

BY DAVID BRIGHT
CW STAFF

ATLANTIC CITY — Although widespread Integrated Services Digital Network (ISDN) implementations may be five years away, managers attending a communications conference here last week said they are eagerly awaiting ISDN's acceptance and, in some cases, have already begun making long-range plans to use the network at their corporations.

"You have to be looking toward ISDN," said a data communications manager from a large bank who attended the Association of Data Communications Users annual conference here.

ISDN is a digital method of integrating a wide variety of computer equipment into local- or wide-area networks. It was designed to provide high-capacity,

IBM IS sitting back and waiting to see what the carriers are going to do. The carriers are waiting for the users. It's a circle."

CALVIN O'HIDY
CHESEBROUGH-POND'S,
INC.

highly reliable data, voice and video transmission. Some trial ISDN networks, including one at McDonald's Corp., have already been set up. But many potential users say the lack of standards and the huge capital investment required prohibit a fast transition to the new technology.

Calvin O'Hidy, telecommunications systems manager at Chesebrough-Pond's, Inc. in Trumbull, Conn., said it will probably take up to five years before vendors, carriers and users are able to coordinate their ISDN efforts. He likened ISDN's progress to that of IBM's Systems Network Architecture (SNA). SNA was introduced in the mid-1970s but did not catch on in a big way until just three or four years ago, he said.

What is needed to make ISDN successful is a single standard, O'Hidy said. IBM, with the help of its Rolm Corp. subsidiary, might be the vendor to offer that standard. "But IBM is sitting back and waiting to see what the carriers are going to do," he added. "The carriers are waiting for the users. It's a circle."

Offering ISDN products is "like giving a party and seeing who shows up," said Stagg Newman Jr., division manager of Bell

Communications Research, Inc. in Red Bank, N.J., who was a featured speaker at the conference. "You may not see anybody for a while."

Newman reminded attendees that ISDN is a technology for the

mid-1990s. One reason for the delay is the "tremendous capital investment" in both hardware and software, he said.

For instance, he said, before ISDN can come into widespread use, there are thousands of

switches throughout the country that will have to be changed. Some of the switches currently in use were installed 50 years ago.

A manager from a large university agreed with Newman.

He said that given the size of the required investments in ISDN, his organization cannot afford to make any rash decisions.

The university is now carefully plotting its networking course for the next five or 10 years, he said, and every decision will have a far-reaching impact. For example, he said that one new switch will initially handle as many as 15,000 to 20,000 stations.

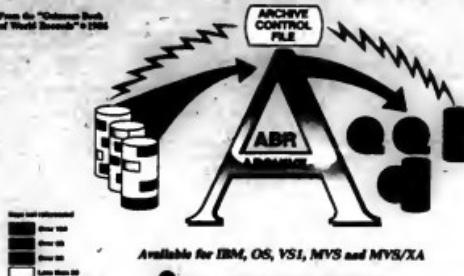
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Apollo continues push into new markets

Adds mid-range workstation, expands connectivity and slashes prices in burst of activity

BY JAMES CONNOLLY
CW STAFF

BOSTON — Apollo Computer, Inc. continued the thrust of workstation vendors into new markets and price/performance ranges last week with a series of low-priced hardware platforms and connectivity options.

Apollo slashed the entry-level price for its DN3000 series by 50%, introduced the mid-range DN4000 series and added personal computing features such as personal computer connections to its network and PC emulation software running on Apollo's Motorola, Inc. 68020-based workstations.

The introduction of a \$4,990 DN3000 and the DN4000, with a base price of \$13,900 for a monochrome, diskless workstation, came two weeks after DEC and Esprit Corp. drove the entry-level point for its Vaxstation 2000 line from \$10,500 down to \$4,800. Two months earlier, rival Sun Microsystems, Inc., which is expected to announce high-performance workstations this week, cut its entry-price to \$4,995.

The DN4000 is aimed at the high-performance needs of the electrical- and mechanical-design markets, in which Apollo is already strong. But that system and the DN3000 family are also intended to build on Apollo's limited presence in areas such as computer-aided software engineering (CASE), technical publishing, financial services, artifi-

cial intelligence and imaging.

Cheryl Vedoe, Apollo's group manager for personal workstations, said the DN3000 is aimed at price-sensitive markets, including CASE and technical publishing.

Apollo also expects to build on its office automation capabilities within those markets through agreements with vendors such as Wang Laboratories, Inc. and Phoenix Technologies Ltd.

However, one analyst, Marcia Brooks of Framingham, Mass.-based research firm International Data Corp. (IDC), said she was impressed by how Apollo is broadening its base but cautioned that if Apollo ventures too far into the general computing field, the firm will find stiff competition in head-to-head battles outside its traditional market with companies such as IBM and DEC.

"I don't think we're going to go out immediately and start selling the DN3000 as a general computing system in the OA marketplace. . . . At the same time, we are starting to move into market areas such as financial services, and, as we get into those markets, OA will become more important," Vedoe said.

Phoenix and Apollo developed Domain/PC Emulator, which is the IBM Personal Computer software emulator announced last week. The \$500 package allows an Apollo user to run PC applications in a workstation window. According to Apollo, the emulator runs at the

speed of an IBM PC XT.

Apollo also offers DN3000 and DN4000 users a hardware option, which runs at the speed of an IBM PC AT but costs \$2,400.

Products such as the emulator could drive workstation vendors into the general office automation market, said officials at Motorola, which supplies its

erating system for the Intel Corp. 80386 microprocessor until PC use in multuser environments for at least a year. He claimed Unix-based workstation vendors have the communications needed to build networks and mainframe links and \$2 billion worth of OA software written for the 68020.

IDC's Brooks said Apollo, once reliant on the proprietary Domain network, is showing a commitment to open architectures and standards such as Ethernet and FDDI networking options unavailable elsewhere.

Brown noted that Apollo chose not to undercut DEC by pricing its "entry-level" system at \$12,900. "Even though they announced two weeks after DEC, they didn't play the game of saying 'we're going to be at the bottom and in price,'" said Brooks, noting that Apollo justified keeping its price \$390 above DEC's by saying the DN3000 is more expandable than the Vaxstation 2000.

The diskless DN3000 costs \$4,990 with 4 Mbytes of memory, a floating-point coprocessor, one serial port, an Apollo Domain/TX operating system license and a 60-Mbyte cartridge tape drive costs \$45,400.

Shipments are scheduled for August.

A \$4,900 server with 4 Mbytes of memory costs \$12,400. Apollo also enhanced the DN3000 family with a 15-in. monochrome monitor with 1,024-by-800-pixel resolution.

Apollo also enhanced the DN3000 family with an 8-bit-plane graphics controller providing simultaneous display of up to 256 colors and an engineering change that frees two slots in the PC AT-compatible bus.

Apollo claimed that 20,000 DN3000s have been shipped since the system was introduced in February 1986.

In a competitive analysis, Apollo claimed a price per seat of \$12,340 for the DN3000 and \$80,000 server in a four-user configuration, compared with \$17,870 for a Sun 3/50M and 3/260S configuration.

Apollo claimed DEC and Sun have no systems comparable with its DN4000, which Apollo said is a PC-type desktop machine with high-end workstation power.

The DN4000 is based on a 25-MHz 68020, which Apollo said takes 4 million instructions per second. It has a 25-MHz 68881 coprocessor, 16 Mbytes of memory, a 19-in. color monitor with 1,024-by-800-pixel resolution, 8-bit-plane, a network interface, Domain/TX and Apollo Arcus licenses, a 34.8-Mbyte disk drive and a 60-Mbyte cartridge tape drive costs \$45,400.

Shipments are scheduled for August.

A \$4,900 server with 4 Mbytes of memory costs \$12,400.

The company also announced Domain/PC-Ring, which connects a PC to the Apollo token-ring and costs about \$1,150, and plans to offer an Ethernet connection next year.

Multiuser micro system uses fiber-optic links

BY ALAN LIPER
CW STAFF

NEW YORK — A start-up company last week unveiled what it claimed is a new concept in workgroup computing, combining Intel Corp. 80386-based systems with high-speed fiber-optic links for use with multiuser, multitasking operating systems.

Jackson, Miss.-based Sunriver Corp.'s approach entails linking diskless workstations via fiber-optic cable to an 80386-based microcomputer to enable each to function as a separate 386-based personal computer as much as 1,000 feet from the host. By using a fiber-optic link, the diskless workstations can exchange data with the host at 32MB bit/sec., Sunriver claimed, an order of magnitude greater than the 1.92K bit/sec. data rate of conventional dumb terminals.

The firm and its task lends itself well to a variety of multiuser applications in which speedily interacts between host and

workstation is required and that it is particularly well suited to generating business graphics — an application that depends on the greater processing power and larger memory capacity of 386-based micros.

"Our approach allows the 386 to distribute its processing power over the user base, providing for true multiuser and multitasking functionality," pointed William Long, Sunriver's president and chief executive officer.

Operating systems

A 386-based host in a Sunriver system reportedly supports a variety of operating systems, including the following: VP/IX and Merge 386, in which Unix runs as a task under Microsoft Corp.'s MS-DOS; Phoenix 386 and PC-MOS/386 — multiuser operating systems that emulate Microsoft's MS-DOS — and 386/IX and System V/386, Unix implementations for the 80386.

On a per-user basis, Sunriver's multiuser system is between 25% and 50% less expensive than either conventional PC networks or Intel 80286-based multiuser micros, claimed Garry Youngblood, executive vice-president and chief financial officer.

A Sunriver system with Compaq Computer Corp.'s Desktop 386 as its host costs \$4,528 per user vs. \$6,018 for a three-user network or \$4,723 for an IBM Personal System/2 Model 30 or 60, the firm claimed.

Those systems all run a multiuser version of MS-DOS and are equipped with IBM's Enhanced Graphics Adapter (EGA)-capable video card, the firm noted.

Van Westren, director of Datasystem, Inc.'s Business Computer Systems Division Industry Group, said Sunriver's approach facilitates the speedy generation of business graphics, one of the fastest growing applications by users of business computers.

"For that reason, I think the product has tremendous potential," he added.

The firm is offering four diskless workstations featuring 14-in. displays; a variety of color-mapped graphics support capability; one parallel and two serial ports; a 101-key IBM Personal Computer AT-style keyboard; and an AT sound chip and speaker.

The entry-level station supports IBM Color Graphics Adapter (CGA) color graphics, while the high-end family member offers resolution of 640 by 480 pixels, the ability to display up to 16 colors and CGA color, EGA and EGA+ and Hercules Color Technology, Inc. graphics boards, the firm stated.

Scheduled to be available in October, the workstations range in price from \$1,599 to \$2,299. An adapter board for a 386-based micro with an AT bus facilitates the attachment of up to

four of the diskless workstations via fiber-optic cable. Since AT-class machines offer three 16-bit slots, up to 13 workstations, including the host, can share the resources of the 386-based micro, the firm said.

Priced at \$799, the board will reportedly be available in October.

The firm is also offering an adapter card to allow an IBM PC or compatible to function as a 386-based microcomputer. It too is priced at \$799 and will reportedly be available in October. Sunriver said it intends to offer an adapter for IBM's PS/2 family that uses IBM's Micro Channel bus and will develop fiber-optic links for systems using Multibus and VMEbus architecture.

The company said it plans to sell its products through OEMs and value-added resellers. It already has a deal with SCI Systems, Inc., in Huntsville, Ala., and is negotiating with PGI Corp., a reseller affiliated with Tempe, Ariz.-based Micro Age Computer Stores, Inc., according to Sunriver's Youngblood.

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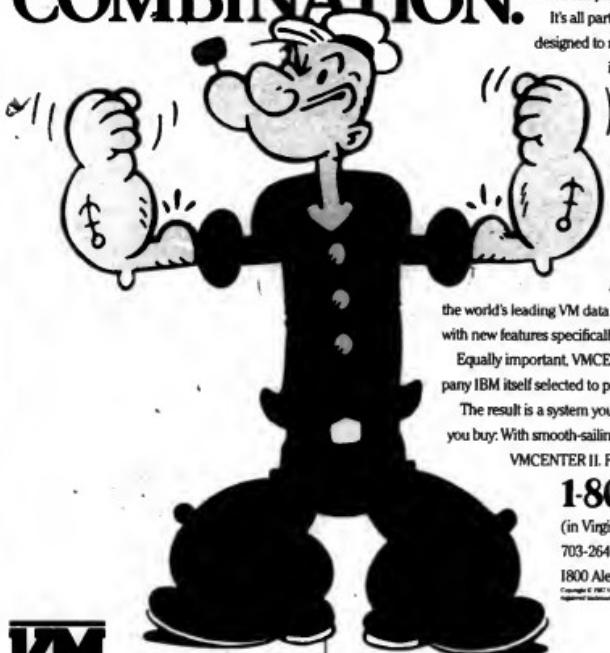
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IBM, Locus to co-develop PS/2 AIX system

BY PATRICIA KEEFE
CW STAFF

SANTA MONICA, Calif. — IBM and Locus Computing Corp. last week announced plans to jointly develop the IBM Personal System/2 AIX operating system, which was first announced during IBM's April 2 unveiling of the PS/2 line.

The Unix-based PS/2 AIX has been characterized by some industry observers as a strategic, multiuser, multitasking operating system designed to encourage corporations to purchase their own PS/2 systems. PS/2 Model 80, which is based on Intel Corp.'s 80386 microprocessor.

Locus President Gerald Popk claimed that previous Unix-based products from IBM have been offered at the other extreme as if IBM were saying, "Here's some software; use it, but don't call us about it."

Partnership public

The announcement was also the first public acknowledgement of a new 4-year-old development agreement between Locus and IBM. PS/2 AIX is the first product to result from that partnership, Popk said.

"You might imagine there are more to come," he said, adding that Locus will unveil more details next week.

The new operating system is based on AT&T's Unix System V, Release 2 and will run on the PS/2 Model 80. PS/2 AIX will support Microsoft Corp.'s MS-DOS 3.3 as a task under Unix. While he said that "nothing is being said about OS/2 support," he did point out that OS/2 is an important part of IBM's strategic plan.

The PS/2 AIX software is a subset of, and compatible with, its predecessor, AT&T's RT Personal Computer, which was developed by IBM and Interactive Systems Corp., a Locus rival and neighbor in Santa Monica. However, PS/2 AIX reportedly won't run just as it is on IBM's RT Personal Computer.

Buy while you wait

But to analysts, the key to PS/2 AIX, or any 386 Unix port, lies in its ability to provide users with a multiuser, multitasking virtual

low-cost personal computer compatible applications to run in a window without modification, Popk said. LX Windows is neither Microsoft Windows compatible nor a clone, he said, adding that "the right environment to track is IBM's Presentation Manager layer." Popk hinted at future support for IBM's OS/2 running as a task under Unix. While he said that "nothing is being said about OS/2 support," he did point out that OS/2 is an important part of IBM's strategic plan.

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But to analysts, the key to PS/2 AIX, or any 386 Unix port, lies in its ability to provide users with a multiuser, multitasking virtual

operating system — and, hence, a reason to buy the PS/2 Model 80 — while they wait for delivery of applications designed for IBM's OS/2.

For example, Xenix 386 is available immediately from Micropro Systems, Inc. in Scotts Valley, Calif. "That's the whole point of Xenix for any version of Unix right now," said Bruce Steinberg, director of marketing communications for Xenix developer San Jose, Calif. His company said it will announce PS/2 ports of Xenix this week.

There is also speculation that OS/2 will be late and that IBM is trying to cover its bets. "IBM is announcing PS/2 AIX because they are behind Unix or because OS/2 is going to be real late," asked David Fidler, publisher of Infopres newsletter. "Unique," a Unix newsletter, "IBM might be saying, 'Do we want to end up in the position of having all these great products [in the PS/2 series] but no software to take advantage of it?'"

This is critical," said Brian

Boyle, an analyst with Novon Research in Berkeley, Calif. "The only reason you'd buy a 386 PS/2 is for multuser — multitasking at the very least," he said. "People have to have some reason other than just faster intel 80386-based MS-DOS, to buy a 386 machine."

PS/2 AIX is also said to be positioned against Microsoft's VP/IX, which was recently licensed from Interactive Systems. Interactive Systems has agreed to create VP/IX, which supports MS-DOS as a task under Unix, to support MS-DOS under Xenix.

The Locus-IBM partnership also raises questions about IBM's long-standing public relationship with Interactive Systems. IBM has co-developed or licensed four Unix products from Interactive Systems: IX/370 and VM/IX for IBM mainframes, PC/IX for IBM's PC and AIX for the RISC PC. When asked whether Locus was replacing Interactive Systems as IBM's Unix supplier, Popk said, "This release sure shows where IBM stands." Efforts to reach Interactive Systems President Ronald Fisher and Vice-President Bernie Hill for comment were unsuccessful.

Competition

FROM PAGE 1

fore with the rates that Fortune 150 companies require. Granted, there will be fewer players, but the competition is there."

Life after tax reform

The leasing industry's consolidation (see chart) has hastened dramatically since the U.S. Congress repealed the investment tax credit last year.

Parent leasing firms, financial institutions or regional Bell holding companies provide formerly medium-size lessors with the substantial capital needed to keep their hardware portfolios stocked. After tax reform, the smaller firms lost much of their ability to raise capital by selling the tax advantages of lease deals to investors.

Notable examples of this trend include the sale of UK-based United Leasing PLC and its U.S. subsidiary, Unilease Computer Corp., to The Meridian Group; the South Corp.'s acquisition of Datavener, Inc. and the proposed buy-out of CMI Corp. by Comshare Information Systems Corp., which faces a similar challenge from CMI President Edward Cherney [CW, June 1].

"Computer leasing is shifting from a very entrepreneurial industry to an oligopolistic one," says Harvey Kinselberg, chairman of The Meridian Group. The top 10 lessors — currently controlling 35% to 40% of the U.S. leasing market — will claim an 80% market share within four

Consolidation and shakeout

Acquisitions in U.S. computer leasing industry, 1987

Acquired company	Prior	Buyer	Seller
CMI Corp.	\$50 million	Continental Information Systems Corp. (gaining control of interest by CMI executives)	First National Corp. and Stephens, Inc.
Equitable Life Leasing Corp.	About \$200 million	Lerner & Nathan Financial Corp.	Equitable Leasing Corp.
Thomas Mathematics Computer Corp.	\$25 million to \$40 million	Paruscorp	Thomas Mathematics
First National Capital Corp. (several assets)	Undisclosed	McDonnell Douglas Finance Corp.	First National Capital
United Leasing PLC/Datavener Computer Corp. (U.S. subsidiary)	\$80 million	The Moritz Group	United Leasing
Burns Leasing, Inc.	\$4 million	Investor group headed by former Burns executive	Nets Technologies, Inc.
Michael K. Varga, Co.	Undisclosed	Econocom USA	Michael K. Varga, Co.
Greyhound Capital Corp. (October 1986)	\$140 million	Bell Atlantic Corp.	Greyhound Corp.

CW STAFF

years, according to Richard Kanian, president and chief executive officer of Capital Associates International, Inc. But unlike other consolidations, as well as a shrinking vendor community can result in higher prices, the traditionally aggressive competition in computer leasing is expected to continue even after a major shakeout.

"God forbid you lose market share," Kinselberg says. "It's cutthroat out there."

The competitive arena in leasing is shaped by many other factors in addition to the number of lessors competing for a given

deal. Lease rates have not increased as much as rental after tax reform, because lessors became residual values — the forward-rental price of a used PC or peripheral, when a lessor leases the equipment — have gone up. Since the lessors' profit margin is a combination of the lease rate and the re-marketing value of the equipment, a lessor using higher residual forecasts can set rates more aggressively.

IBM Credit Corp., which sets market parameters at the high end, is fueling competition with that residual-rate formula, according to Al Schwarter, manag-

er of computer operations analysis at United Technologies Corp.

"IBM Credit is turning up the heat; I'm amazed at the residual positions they take," Schwarter says. "As a result, I've seen much more creative leasing deals being talked about by major independent leasing companies."

Most lessors and industry watchers say that regardless of industry consolidation, there will be plenty of lucrative niche opportunities for small regional or specialized lessors. "There are firms doing good business on leases for the IBM 8100," says Wally Papsik, senior vice-president of market research firm Computer Intelligence Corp. "That may not be something that a real large company wants to bother with."

"The little guys will survive with what they call 'economics of small' — lower overhead," says Bill Fleischman, assistant vice-president of Equitable Bank. Large corporate accounts that solicit many lease bids from both large and small lessors, however, may see a negative impact from the industry consolidation. "I would rather see more people out there to deal with, as long as they're reputable," says Randy Heinrich, senior purchasing agent for McDonnell Douglas Aerospace Information Services. "We're not really typical; we have shunned IBM Credit to do business with \$1 million companies that were able to win the bid. I think those companies will get swallowed up, and it will be harder to cut good deals with large leasing conglomerates."

Fortune renamed

BELMONT, Calif. — The seven-year life of Fortune Systems Corp. came to an end last Wednesday when the firm completed the sale of its supermicrocomputer hardware business and officially renamed itself Tigera Group, Inc.

Fortune Systems said it has completed the previously announced sale of its hardware operations to SC1 Systems, Inc. for \$15.5 million.

SC1 Systems is a supplier of components and electronic equipment based in Huntsville, Ala.

Tigera Group reportedly will continue to market and support Fortune Systems' line of office automation software. That line includes products such as Fortune Word, which will now be marketed under the name Word Era.

Former Fortune Systems President James S. Campbell, who will remain president of Tigera Group, said in a prepared statement that the new company will attempt to expand its line of office software through acquisitions.

CORRECTION

Version 3.1 of Jaset from Joiner Associates, Inc. in Madison, Wis. [CW, June 29], is priced from \$7,000 to \$23,500.

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At Continental Container Systems, CMS has already improved inventory turns by an average of 40%. Overall lead-time is down by almost 43%. On-time delivery has doubled. And the shop-floor has been streamlined. The division uses all eight CMS modules including Bill of Materials, Master Production Scheduling, Inventory and Cost Control. Virtually all of their workforce interfaces with the system every business day. They knew that CMS is productivity - perfectly packaged.

For more information on how you can access Cullinet through CMS software, call toll-free 1-800-551-4555. Or write to Cullinet Software, Inc., 400 Blue Hill Drive, Westwood, MA 02090-2198.

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DMS 100 architecture to open

Northern Telecom counts on Bells offering info services

BY ELISABETH HORWITT
CW STAFF

Anticipating that the regional Bell holding companies will eventually receive regulatory approval to offer information services, Northern Telecom, Inc. is expected this week to open up its DMS 100's architecture so that local carriers can develop their own software for the central-office switch.

A Northern Telecom spokesman told *Computerworld* that the DMS 100's proprietary architecture, which currently

runs only the vendor's internally developed software, will be changed "to allow the telephone companies to develop their own applications" that will support future information services.

U.S. District Judge Harold H. Greene last week heard comments from industry and users groups on whether to lift the ban on the regional Bell holding companies offering such services (see story page 1).

While Northern Telecom has revealed that it intends to open the DMS 100's architecture, the company is said to be an-

nouncing products that will make this happen and to be "keeping a lid on" the nature of such offerings, according to Peter Bernstein, senior research analyst at Probe Research, Inc.

Bells worry

The regional Bell holding companies may be leery about committing their information processing systems to a central-office switch from Northern Telecom or any other vendor, Bernstein said.

Ameritech, for example, is reportedly working with Digital Equipment Corp. on a separate computer-based "feature node" that would "give access to the central-office switch" for information processing purposes, he said. By implementing intelligence apart from the switch, the

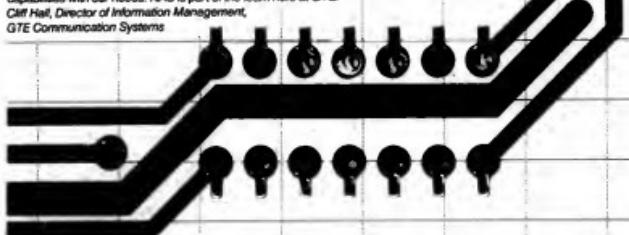
firm would be able to develop information-service offerings without being dependent on what protocols and features a company like Northern Telecom or AT&T decides to offer, he noted. Ameritech already has the facilities for developing feature-node software through its subsidiary ADR Services, Inc., he added.

A next step for carriers will be to link their central-office information services with existing applications on customers' on-site computers, said John Walsh, managing director of New York consulting firm Integrated Strategies Group, Inc. "I think the next-generation private branch exchange will be a hybrid that perhaps runs Unix or [DEC's] VMS and communicates with the central-office switch," Walsh said.

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CMP Hall, Director of Information Management,
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Hitachi adds two supers

BY YASUKO YOSHIMI
AND LORI VALIGRA
EDC NEWS SERVICE

TOKYO — Hitachi, Ltd. last week announced two high-end supercomputers that it said are faster than the most powerful Cray Research, Inc. models.

The Models S-820/80 and S-820/60 operate at up to 2 billion floating-point operations per second (GFLOPS) and 1 GFLOPS, respectively. The performance is more than double the speed of Hitachi's existing Model S-810 supercomputers.

Hitachi positioned the products against top-of-the-line models from Fujitsu, Ltd. and NEC Corp., claiming that the fastest Cray-2 supercomputers, whose peak performance is also estimated at 2 GFLOPS, are slower.

A Hitachi spokesman said the company expects to book 60 orders in Japan for the S-820s during the next five years. Meanwhile, the company has already shipped 14 of its 18 orders for the S-810s. Hitachi said it is interested in marketing the new models overseas but did not disclose details. Fujitsu and NEC have made agreements with Amdahl Corp. and Honeywell, Inc. to distribute Fujitsu and NEC supercomputers in the U.S., although only one of those systems — a NEC SX-2 at the Houston Area Research Center — has been installed in the U.S.

Included in the S-820 machines are technologies designed to boost system speed, such as vector-register large-scale integration parts that boast 2.5-nsec access times. The system reportedly includes two integrated extended storage units that hold 3G to 12G bytes of information.

The primary applications for the models are semiconductor design, structural analysis and weather forecasting. The object code from the three existing S-810 models will run on the S-820s, according to the vendor.

The Hitachi spokesman said the S-820 models will be available in the first quarter of 1988. Monthly leases for the S-820/80 and S-820/60 reportedly will begin at \$552,000 and \$393,000, respectively. Even though there have been orders for 65 supercomputers in Japan, International Data Corp. of Japan noted, only a small percentage of those orders will ever actually be installed.

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Harris boosts power on supermini line

BY JAMES CONNOLLY
CW STAFF

FORT LAUDERDALE, Fla. — Harris Corp.'s Computer Systems Division last week extended its H Series of real-time superminicomputers with multiprocessor versions that reportedly provide up to three times the power of earlier H Series high-end systems.

The H Series is a family of 48-bit systems that was designed for use in real-time simulation and precision scientific and engineering applications such as aerospace engineering, trainer simulation,

compute-intensive research and process control.

The multiprocessor models are the dual-processor H-1500, which the company has rated at 10 million instructions per second (MIPS) using Whetstone benchmarks, and the triple-processor H-1600, which Harris has rated at 15 MIPS. The previous high end of the H Series was the 5-MIPS H-1200.

Computes stand alone

The company also announced two compact uniprocessor models that can be used as stand-alone systems or in combination

to form an H-1500 or H-1600.

The H-900 and H-1100 were designed to provide comparable power while occupying one-half the footprint of the earlier H-1000 and H-1200.

The systems utilize emitter-coupled logic technology-based gate arrays and memory subsystems. They support up to 12M bytes of memory per CPU and feature dual memory buses.

They run Harris's RT-VOS, VOS and VUE operating systems.

In addition, the systems run RT-VOS/MP, which Harris announced last week.

According to Rick Maule, director of product marketing for Harris, RT-VOS/MP includes scheduling tools and tracking and maintenance functions that are intended to allow users to concentrate on their applications.

RT-VOS/MP also reportedly provides a single point of control for a closely coupled multiprocessor complex of up to 12 CPUs. That control allows centralized system loading, configuration, task scheduling, synchronization and diagnostics from a single operator console, Maule said.

The H-1500 is priced from \$555,000. The H-1600 has a starting price of \$795,000. Entry-level prices for the H-900 and H-1100 are \$240,000 and \$260,000, respectively.

California computer bill stalled

BY JEFFREY BEELER
CW STAFF

SACRAMENTO, Calif. — A proposal to toughen the state's computer crime statutes failed last week, at least temporarily, to clear what its proponents regard as its most crucial legislative hurdle en route to ultimate enactment or rejection.

By only one vote, Senate Bill 255 (SB 255) fell short of winning approval in the California Assembly's Public Safety Committee.

During a June 29 hearing, the committee granted a continuance to SB 255's author, state Sen. Ed Davis, and directed his staff to rephrase the bill by July 13 to address last-minute objections by a labor union representing office employees.

"We have reasonable prospects of being able to devise some language that would amend the bill to make it acceptable both to its opponents and supporters," said Charles Fennessey, Davis's legislative consultant. "The problem is to satisfy everybody's concerns without requiring a redefinition of embezzlement and petty larceny under the state's penal code."

Even if it survives its next encounter with the Public Safety Committee, SB 255 still must go before the full California Assembly and then the governor before it can be signed into law.

If the bill becomes law, almost any systems security breach would be deemed a felony — and punished accordingly — even if no assets were stolen during the attack and its data remained undamaged [CW, June 22]. Under existing California law, violations are considered illegal only if intended to cause harm.

During hearings last week, the Teamsters union, which represents a variety of clerical employees, raised the possibility that the proposed law would make illegal common office practices that are seldom condemned but which it said are too trivial to warrant prosecution.

Barry Broad, the union's legislative counsel, cited the example of employees who use their companies' mainframe resources to draft personal resumes. "To treat such misconduct as a felony is absurd because nothing of value is taken," Broad said.



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Microsoft loses Taiwan piracy battle

BY TOM MCHALE
and BEN LIM
EBC NEWS SERVICE

TAIPEI, Taiwan — Microsoft Corp. suffered a major setback recently in a bid to end alleged counterfeiting of its MS-DOS operating system by Taiwanese manufacturers. Taipei District Court handed down verdicts of not guilty in June to three defendants in the vendor's case against Evergood International.

The court's decision sets a

precedent for other cases that are pending, and Microsoft is expected to appeal the ruling in Taiwan's High Court. The case has broad implications for Taiwan's computer industry, as Microsoft is reported to have warned more than 200 companies of impending legal action.

The District Court concluded that Microsoft had licensed MS-DOS technology to U.S.-based Falcon International, which had, in turn, licensed manufacturing rights to a Hong Kong company referred to in court as M.U.L. The Hong Kong company is said to have received permission

from Falcon to authorize the manufacture of the operating system software in Taiwan, Singapore and Australia.

Documents verifying the contracts were produced in court, and the judge maintained that they prove an absence of criminal intent by Evergood.

Sources said Microsoft did not seek damages from the Taipei company but that it had

asked the judge for severe punishment of Evergood if that company did not cease production of the operating system.

Microsoft reportedly also will petition other courts in Taiwan and the U.S. to continue impounding copies of MS-DOS from Evergood and other allegedly unauthorized Taiwan makers while the appeal is in progress.

IBM typing system out

BY ALAN J. RYAN
CNET STAFF

NEW YORK — IBM announced last week its Personal Typing System, which it described as "the merger of the typewriter and computer," and an application package that reportedly gives its Personal System/2 Model 30 computer the capabilities of the typing system.

Analysts said the system amounts to little more than a packaging variation that targets the PS/2 Model 30 at the secretarial market and expressed doubt as to how much demand there will be for such a product.

"Historically, personal computers aimed at secretaries are not something people have lined up to buy," said William Zachmann, vice-president of research at International Data Corp. in Framingham, Mass.

"It seems to us that the day of dedicated word processing has passed," said Bruce Jenkins, an editor at Datatech, Inc., a market research firm in Cambridge, Mass. The Personal Typing System "is going to be a tough sell," Jenkins added.

Four models of the typing system were announced. Each model reportedly consists of a system unit with an Intel Corp. 8086 microprocessor, keyboard, color or monochrome display, impact or nonimpact printer and software.

The new system is "basically a way for IBM to sell the Model 30s through its typewriter dealers," Zachmann added.

The suggested single-unit purchase price for the Personal Typing System Model 1, which includes a system unit and keyboard, software, a monochrome display and an impact printer, is \$2,895.

Solutions: Personal Typing is scheduled to be available later this month and will sell for \$1,575 with the Correcting Wheelwriter Printer and \$1,975 with the Correcting Quietwriter Printer.

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Millenium to offer DB2-CICS tie

Version bridges system gap, allows flexibility in development and use

BY CHARLES BABCOCK
CW STAFF

NATICK, Mass. — McCormick & Dodge Corp. is preparing a version of its Millenium SDT development environment that it claims will allow users to develop and run production applications for IBM's DB2 under CICS.

Current users of DB2 must rely on IBM's TSO if they want to use IBM's Query Management Facility or run on-line interactive queries.

To run transaction processing, they must switch into CICS, according to John Birch, vice-president of M&D's Distributed Systems Business Unit.

A combination

"In effect, we combine both. You need to use only one development environment to fully develop any production application," said Barrett Williamson, director of DB2 development efforts at M&D.

Company officials disclosed the nature of the \$110,000 product in a background briefing last week. In effect, what is now known as M-SDT DB2 will be a Millenium application that will support DB2 application development around the existing Millenium platform, the firm said.

That platform includes the

procedural definition fourth-generation language called PDL and nonprocedural facilities to define data, screens, queries and other system elements, create data base records, paint screens, create windows and impose multiple security.

M&D said it has about 400 licensed customers of the 3-year-old SDT technology.

The applications developed with SDT DB2 will also be able to use IBM's VSAM files, a feature that Birch said will help ease the transition to DB2 by many large users. Other features include the following:

- Use of eight screens in SDT DB2 to develop SQL-based applications,

- A query answer screen to allow a programmer to set up SQL statements behind a screen to answer English-like questions raised by a user's prompt.

- An interactive SQL screen to help a programmer compose SQL statements.

- A report-formating screen that allows a programmer to preformat the rows and columns of a report; up to 32K bytes of data may be placed in a row.

The programmer can select a column and shift it to the left or right until it sits alongside another column with which it must be associated for a particular re-

port, Williamson noted.

The report formatter can also employ control breaks, totaling a set of numbers at a pre-designated point or highlighting minimums or maximums.

Tightly integrated

The SDT development system is tightly integrated with DB2, M&D officials claimed. "We popularize our control tables and dictionary straight from DB2," Williamson said.

PDL is an interpretive fourth-generation language with which an application prototype may be constructed.

For efficiency purposes, most of a finished SDT production application built with the Millenium facilities will be composed in assembler and Cobol, with a few customized programming parts employing PDL, according to Birch.

M&D used the original Millenium to develop its integrated set of accounting applications and later offered Millenium SDT as a development environment.

Applications developed with Millenium SDT are able to share data and files with other M&D applications, the firm said.

The Millenium platform itself is provided at no cost to any customer of the vendor's applications.

HP hikes prices by 2%

BY JEFFREY BEELER
CW STAFF

PALO ALTO, Calif. — Hewlett-Packard Co. last week raised by an average of 2% the list prices for a broad assortment of the company's storage and output devices.

The price hike affected HP's cartridge tape subsystems, reel-to-reel tape units, system printers, disk modules, terminals and 1000 series factory-automatic processors, according to a company spokesman.

Not affected by the adjustments were the vendor's personal computer family, third-party PC software, ink-jet printer line and 3000 series commercial processors, including HP's Precision Architecture machine, the spokesman said.

The increases are already reflected in the firm's latest price lists, but any user who orders equipment before June 1st will still be charged under the old pricing structure, HP said.

Last week's development coincided with a preholiday lull, when many users customarily take their vacations. It ended a protracted period of HP pricing stability.

"The last time we announced a wide-ranging increase of this kind was in late 1984," the spokesman recalled. Since then, he added, "the business climate has been fairly sluggish. But recently, general economic conditions have improved to the point where we now feel we can afford to pass along a modest price increase that reflects our growing expenses."

For reasons not directly related

to the rest of its July 1 announcement, HP said, the vendor also boosted prices for its LaserJet Series II and LaserJet 2000 printer families by an average of 1%.

In the wake of the price hikes, a LaserJet Series II that formerly cost \$2,495 will now sell for \$2,595. Prices for the \$21,495 LaserJet 2000 Model P and \$24,995 Model D were raised to \$22,995 and \$25,695, respectively.

Unaffected by the price changes were the LaserJet 2000 Model A and the mid-range LaserJet 500 Plus, which still costs \$4,495.

Falling dollar to blame

The factor that is said to have necessitated the increases in the LaserJet families' prices is tied to the international currency front. The falling value of the dollar, relative to the yen, has increased the cost of the LaserJet's Japanese-made parts, the HP spokesman said.

Although the rise in the printer line's price will do nothing to engender goodwill within the vendor's customer base, the move is unlikely to have serious repercussions, according to HP user Charles Shimaide, systems manager for Account-a-Call Corp. in Los Angeles.

"On the LaserJet 2000 side, in particular, a price increase of only \$500 to \$600 may make purchases a little harder to justify," Shimaide said. "But it's not enough to upset any planned acquisitions." Shimaide's comments about the LaserJet family applied equally to the rest of HP's repriced products.

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FBI info system expansion assailed

Civil libertarians call planned data base growth, other agency links a threat to privacy

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — The Federal Bureau of Investigation is mulling over a new proposal to dramatically expand its criminal information system, while civil libertarians charge that the plan is a "major threat to citizens' privacy."

The Advisory Police Board to the FBI's National Crime Information Center (NCIC) recommended that the NCIC be modernized to include on-line links to data bases at the Securities and Exchange Commission, the Social Security Administration and other federal agencies.

In addition, the board's preliminary NCIC 2000 plan would create a new data base to help law enforcement authorities track the movements of criminal suspects across state lines. The data base could include anyone under investigation by police.

High-tech detection

Law enforcement officials said the FBI should apply the latest computer technology to improve the NCIC's capabilities in order to meet public demands for catching criminals.

Jerry J. Berman, chief legislative counsel to the American Civil Liberties Union, however, said the proposal would allow authorities to create "electronic dossiers on citizens" and could easily be abused.

According to Berman, "The FBI used the NCIC in this way to track antiwar and civil rights demonstrators in the early 1970s until it was disclosed to the public and condemned by members of Congress."

He urged Congress to enact legislation restricting the NCIC to information already on the public record, such as arrest warrants, stolen property reports and criminal history records.

Rep. Don Edwards (D-Calif.), chairman of the House Subcommittee on Civil and Constitutional Rights and a frequent opponent of expanding the NCIC, is planning to hold hearings on the issue in the fall, an aide said.

Under consideration

In response to the criticism, the FBI issued a statement that the advisory board's recommendations "will be reviewed at the highest level of the FBI, to include review by Acting Director John Otto, prior to any final decisions being made. Congressional concern regarding these issues will be fully considered."

The FBI said it hopes to finish the NCIC 2000 system design and issue a request for contract bids next year.

Lloyd A. Smith, manager of Oregon's criminal justice information system and a member of the NCIC advisory board, said the interests of police and privacy advocates will have to be balanced, "if the public expects the police to do investigations and be protected from criticism."

"More of the things we're talking about are relatively innocuous compared to what other government agencies already know about us," Smith said. But the NCIC system should be subject to appropriate data-integrity controls and access controls, he added.

The latest controversy about the

NCIC was touched off last month when the 30-member advisory board approved a preliminary plan for modernizing the center's 20-year-old information system through the year 2000.

Longer arm of the law

Among the approved recommendations was one to create a new data base for tracking the movements of individuals on parole or probation, convicted terrorists, foreign spies, vehicles "of investigative interest" and those who are the subjects of any criminal investigation.

The board's proposal for NCIC 2000 would also establish on-line linkage to numerous federal data bases, including Social Security records, immigration and passport records, the FBI's fingerprint files and files on financial securities, registered weapons and federal prison inmates.

In addition, the board supported the following recommendations for the expanded NCIC:

- List the "known group membership" of

wanted individuals.

- Add misdemeanors and juvenile crimes to its criminal history files.
- Improve the search capabilities of its data base software to increase the number of "hits" from a query, such as by permitting inexact matches and allowing searches by nickname and by modus operandi.
- Add the ability to transmit photographs, fingerprints, signatures and other images.

Apparently aware of the privacy concerns, the advisory board rejected a proposal to track "associates" of criminal suspects. It also rejected a proposal to obtain on-line access to private data bases, such as credit bureaus, airline passenger lists and telephone records.

DATELINE: NEW YORK

Executive confesses to computer collaboration using In-Synch!

John Merson, noted microcomputer industry executive, has confessed to using IN-SYNCH for the purpose of computer collaboration. This is the first public statement in what appears to be the rapid proliferation of IN-SYNCH-based co-computing throughout industry and government.

Collaborating the Easy Way

In an exclusive interview, Merson recounted his actions, from his first co-computing session to his full-blown IN-SYNCH system installed (inexplicably enough). "I'm partier, who was working in our branch office, needed help drafting a proposal for a prospective client. I had an IN-SYNCH, which we were able to work together in real time on a WordPerfect document as well as 1-2-3 spreadsheets. We even developed an AutoCAD drawing and tried to splice on the proposal. I had to splice on the proposal. Merson went on to say that IN-SYNCH made co-computing easy and quick—just as we were sitting side-by-side. No fax machines. No overnight mail. No special networking. Just our modems and the regular phone lines."

Collaborators Get Carried Away

According to Merson, the computer collaboration didn't stop there. "I guess I got carried away," admitted Merson. "I started thinking, what we could do with IN-SYNCH." Apparently, Merson and his partner next used IN-SYNCH to prepare a slide presentation, using screen sharing to show the progression they had developed. Then came the "slides", including text, drawings, graphs and spreadsheet data, were then shown PC-to-PC (again using IN-SYNCH) to a prospective client. "The project has IN-SYNCH on his PC too," continued Merson. "So we dashed him up and delivered our sales pitch online. He loves it! So now he's got a full-time state-of-the-art staff he needs in today's fast-paced business world. We beat out the competition and got the job."



Collaborating and Proud of It

Merson showed little remorse. "You'd do the same thing if you new IN-SYNCH. This co-computing is getting popular on the circuit. The possibilities are too great to ignore. You can co-run all the popular PC software packages. You can transmit and annotate 'snapshots' of screen displays. Developers can write and present 'mail-in' code. And IN-SYNCH keeps 'minutes' so you get a complete audit trail of everything you've done. Managers, engineers, programmers, sales people—they're all going to be using IN-SYNCH. I just got it. And I'll certainly do it again. And I'll do it again."

Poll Shows Collaboration Spreading

Results of an unofficial poll taken by this reporter show Merson is probably not alone in his enthusiasm. An inside source at MCi stated, "We use IN-SYNCH all the time to analyze important revenue data. It eliminates the need to express discrete business partners and remote branches." And according to a highly-placed source at Rockwell International, "We're using IN-SYNCH for some management as well as for training of new PC program users." In perhaps the most stunning admission, the president of Engineering Computer Services, Inc. said, "We're using IN-SYNCH with AutoCAD to help

designers and clients review architectural drawings, thereby expediting schedules and cutting costs."

Cheers for Collaborators

According to a spokesman for AVTC, producer of IN-SYNCH, the company will not press charges against Merson. "We're very pleased and impressed IN-SYNCH that it was the first and only product to bring teleconferencing to the desktop of every PC user. With an innovative product, you've got to encourage creative uses. Off the record, well, hopefully we'll be delighted and we'd just like to say: keep on collaborating!"



For more information or the name of your nearest IN-SYNCH dealer, Call 1-800-641-4461 ext. 80 in New York State, 516-430-8060 ext. 86

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Micro Channel card rings up \$2.5M

BY JAMES A. MARTIN
CHICAGO

FRÉMONT, Calif. — Orchid Technology, Inc. last week claimed it was the first victory in the IBM Personal System/2 Micro Channel enhancement board competition with

some \$2.5 million in orders for its Ramquest 50/60, the first such board to hit the market.

Orchid jockeyed to beat formidable competitors such as AST Research, Inc. and Quadram Corp. into the market created by IBM's PS/2 announcement in early April. Orchid said

that entering the PS/2 market first was of paramount importance in obtaining a strong position in the market.

The company said interest in its card has created record sales for a single product in its first month on the market. Orders for the product are 15% higher than

Orchid had anticipated, and manufacturing efforts have been doubled to meet demands, according to Bill Berkman, product manager.

Ramquest has been exceeding expectations because of its position as the first add-in memory card for the PS/2 Micro Channel models, Berkman said. AST and Quadram reportedly have similar products scheduled

to begin shipping this summer. Analysts disagreed over the importance of Orchid's being first to market. "It can give them a pretty strong opportunity," said Tim Bagarin, executive vice-president of Creative Strategies Research International, a Santa Clara, Calif., microcomputing consulting firm. "The noise made about the first product has great public relations value, and it can build momentum that will carry over to other products."

"Being first to market with a Micro Channel add-on memory board doesn't mean that much," said Richard Shaffer, a microcomputer industry analyst and editor and publisher of "Computer Letter" in New York. "Memory is a commodity, and although Orchid might make a little profit on it for while, the real opportunity will be in the area of communications and graphics enhancement cards."

The current lack of a sizable installed base for the PS/2 Models 50 and 60 and the expected competition from AST and others will soon lessen demand for Ramquest, Shaffer added.

Although Orchid would not say how many units have been shipped, Berkman said about 90% to 95% of the Ramquest orders will be shipped. Ramquest retails for \$995 but is being discounted by as much as 42%, which means that between 2,500 and 4,000 will be shipped from current orders.

The announcement came two weeks after IBM's move to counter widespread skepticism about the success of the PS/2 series. IBM told analysts that approximately 250,000 PS/2 units have been shipped, along with a backlog of orders for 500,000 more units.

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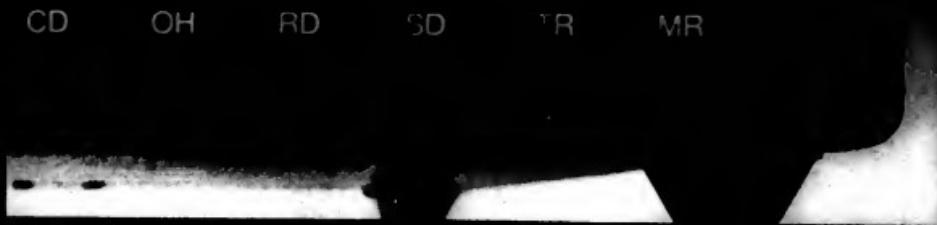
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EDITORIAL

Keeping on top

Vendors are salivating over projections of a \$40 billion market in the early 1990s; their customers — manufacturing executives — are thrilled about the prospect of greatly improved productivity and the revival of export might. Yet, we are told, the promise of drastically revamping and modernizing the U.S. industrial base through computer-integrated manufacturing has generally failed to excite the imagination of MIS.

There are isolated cases where MIS has, willingly or otherwise, become closely involved in developing CIM strategies and processes, but it is clear to observers that, for the most part, engineers and manufacturing executives have played the leading role to date in automating the factory. That is both sad and perilous.

The likely revival in the next decade of the U.S. industrial giant holds for the creative MIS manager the potential to create a challenging career path, along with the opportunity to become a key player in mapping out corporate strategy. For MIS managers in manufacturing to overcome the obstacles barring most from the executive career ladder, it is imperative that they become involved in solving the top crisis facing their companies — production modernization through the use of computer technologies.

The danger that ignorance of CIM holds for MIS careers is the inevitable prospect that information systems personnel will, at a later point, be pressed into action to deal with the millions of lines of software code that will be required in the modern factory. Waiting to be called, rather than volunteering now, means dealing with the documentation and maintenance problems inherent in systems designed by professionals from other callings. These professionals may be more inclined toward one-stop solutions and less cognizant of the need for integration that MIS has abruptly and belatedly had to deal with due to the mass influx of the personal computer.

Technology has been a stumbling block to implementation of CIM, but it seems clear from recent demonstrations and the comprehensive overview of manufacturing software in this week's Spotlight section that technological hurdles are rapidly falling. The MIS manager who dreams of someday attaining that ever-elusive chief information officer status cannot stand idly by while his counterparts in the engineering and production departments grab avidly for the leading role in applying information systems technologies to the factory floor.

It may be comforting for many to begin, claiming that there is still much work to be done in the automation of accounting systems. But for the manufacturing company that is unable to adapt automation to stave off competition, accounting systems will no longer be required. The CEO who is determined to lead his manufacturing concerns into the next century will turn to those managers most willing to trot along the unlighted path of automation, and it will be those managers whose stars will shine, whether they are from MIS or other departments.



LETTERS TO THE EDITOR

Premature piece

You recently printed two letters from readers pointing out your pro-IBM bias (CW, May 25). One said that announcements of future products should not be treated as executive pronouncements, and the other reminded you that IBM pioneered various fields that the giant later entered.

In the same issue, you had an article (page 108) not about existing products or planned products — or announcements — but about possible plans for announcements — by IBM, of course. And learned people vied to be the first to describe what will be announced.

If any other company made an announcement that it would later announce products that will come out in two years' time, you would not give that company a single column inch — unless it was to wonder whether it will be around that long.

*Harlan Rosenthal
Synoptics Inc.
Woodcliff Lake, N.J.*

Wait to divest

On paper, lifting restrictions on the divested Bell operating companies may look good. They already have a direct link to customers, so why not let them use it to provide enhanced information services? Why not let them expand into the business of manufacturing information technology products?

The fundamental problem is timing. Right now, there is no accounting system in place that addresses the consequences of competitive and regulated businesses within the operating companies.

Given the current structure of the divested Bell companies,

which use formulas involving profits and costs of our year-to-set base rates for phone service, the introduction of an unregulated, competitive activity could have a profound effect on the existing regulated phone service.

The divested Bell operating companies could easily raise the consumer's phone bill to meet the capital required to stray out of the local phone-service business and into long-distance, high-tech manufacturing and other related high-risk businesses.

In other words, the operating companies could cross-subsidize new, competitive operations with revenue from the local calling service.

At this time, there is no assurance that the divested Bell operating companies have had the

groundwork to move into competitive areas without disrupting their other basic services. Consumers should ask the courts to exercise restraint in lifting any restrictions on the Bell operating companies until there is such assurance.

*Oliver R. Smart
Executive Vice-President
Computer and Business
Equipment Manufacturers
Association
Washington, D.C.*

Unequal dollars

In 1960, when I graduated with a liberal arts degree, I entered the computer world with an excellent salary of \$123 per week. An excellent salary in 1987 for the same education might be \$723 per week.

If I were to use the logic you exhibited in the 20th anniversary edition (CW, June 1), I would be outraged that today's graduate is paid 487% more than I was. But of course, today's graduate is not — in purchasing power. One of your charts implied that the average cost of hiring a data processing professional today is 3½ times that in 1967. The numbers are meaningless.

You would have given meaning to the charts by indicating how many hours an average company operated and now operates to earn enough profit to hire a DP professional or how many company cars would be equivalent to 10 DP professionals or expense lunches or rolls of newspaper — but not dollars.

My 1947 5 cent candy bar is now 40 cents, but it is the same candy bar. It is the dollar that has changed. That is called inflation.

*Edward C. Cannill Jr.
Product Marketing Manager
Easiclex Corp.
Costa Mesa, Calif.*

JULY 6, 1987



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Missing: Outer Join, referential integrity

SHAKU ATRE

IBM has come a long way as far as its relational data base products are concerned. In 1981 the company announced SQL/DS. Of course, that announcement didn't create much of a stir because SQL/DS supports only DOS/VSE and VM/CMS. Even if VM/CMS is inching toward MVS, the real revenue maker for IBM today is MVS.

Many of IBM's customers using MVS are Fortune 100 companies. With SQL/DS, IBM was putting its toe in the water to see whether the relational data base market would give the company a chit. It took IBM two years to deliver SQL/DS.

In the early 1980s, IBM was losing many data base product sales to competitors such as Cullinet Software, Inc. and Applied

center tool. Of course, DB2 Release 1 wouldn't have passed the muster of the transaction rates needed in a number of organizations for the production applications.

Slowly IBM moved DB2 to center stage with Release 2 in 1986. IMS was orchestrated to take on, with its Fast Path Transaction Processing Facility (a reincarnation of the Airline Control Program, which was the guts of the American Airlines' Sabre system), the high-volume transaction environment.

However, a number of items were still missing in Release 2. What about the on-line performance monitor? What about referential integrity? What about an integrated and active data dictionary/directory that would support text, too? What about updates made to the views being transferred to the data base tables? What about the support of the date and time fields? What about a better integration of application programming tools? Of course, Release 3 must be imminent within a year.

Sure enough, on May 19, Release 3 was announced. VSAM transparency is provided. Date and date fields are supported. Performance is improved. A data base relational application directory that fulfills some functions of the many features in the catalog was announced.

But a number of features still remain to be supported. Referential integrity, an integrated and active data dictionary/directory, distribution capabilities of the data dictionary/directory, support of updates of the views passed on to the data base tables, reporting of matches with join (but reporting mismatches with Outer Join) and, of course, a better integration of the application development tools, such as IBM's Cross Systems Product, Query Management Facility and Application System.

Does it mean the Information Center/1 and the Information Facility are put on hold? And what about interconnecting all of these with OS/2, extended with SQL and interfaced with Enhanced Communications Facility? Does that represent a piece in the crossword puzzle of Systems Application Architecture? How about all of these features, plus a performance improvement with Release 4 by end of this year, or at least early 1988?

With about 1,300 installations in a two-year time frame (a number expected to rise to 2,000 by the end of the year), DB2 is here to stay. But IBM still has a long way to go to implement all the functions.

Data Research, Inc. IBM had to do something. After researching the possibility of providing a relational front end to IMS and announcing that capability as IMS/R, IBM realized that wouldn't work. Major IBM customers had already invested close to five billion dollars in IMS application development. The grand old lady IMS needed a face lift, which was provided by Fast Path.

However, the market was asking for relational. People were looking for some spiritual experience. In 1983, finally, IBM announced DB2. Why DB2 and not DB1? Was IMS DB1? What about SQL/DS — was it DB1? I'm not sure anyone knows, even inside IBM.

In 1985, IBM announced DB2 Release 1's debut — again very carefully, so as not to upset its customers' IMS investment — but how clever to say that IMS was still the production data base management system, and DB2 was just the information

Atre is president of Atre International Consultants, Inc. in Rye, N.Y., which provides consulting and training in data base and end-user computing environments.

Let your talking do the talking

The conclusion drawn from presentation graphics: Less is more

NAOMI KARTEN

Sometimes it is difficult to know which is the problem and which is the solution.

Presentation graphics software makes it a breeze to create visuals. But in an increasing number of business presentations, especially at conferences, the visuals are the presentation — the talk is an afterthought.

Although a picture may be worth a thousand words, too many of these computer-generated visuals require a thousand extra speaker words to make sense out of them.

Ease of use, it seems, is not an unqualified advantage. The downside is that the easier graphics software becomes to use, the easier it becomes to pump out slide after garish slide that incorporates every conceivable feature simply because it's there.

In recent presentations a speaker displayed a slide that included three pie charts describing the company's success relative to its competitors. To say the slide was stazy is an

Karten, president of Karten Associates in Rockford, Ill., is a consultant, trainer and lecturer in the management of end-user computing. She is editor of the monthly newsletter "Managing End-User Computing," published by Ascent Publishing, Inc.

understatement. But was it readable? Was the company's message clear? Did the chart add anything to the narrative? No. The slide didn't highlight the company's success; it masked it.

To begin with, pie charts in turquoise, pink and magenta may be a decorator's delight, but they did not enhance this company's business image by one pixel. The pie charts were presented in three dimensions, which was at least one too many. Each pie was sliced into about a dozen sectors.



KARTEN

The labels were dark, squeezed onto the chart and generally indecipherable. When the speaker tried to explain the slide, he got confused. So the slide displayed to clarify the presentation first had to be clarified itself.

Visual wordiness is another consequence of the Personal Computer Age. At a conference

at which sessions were offered twice, I listened to a speaker whose slides consisted of line after tiny line of text. For the audience, reading a detailed slide and simultaneously listening to a speaker can be difficult.

So I tried an experiment. I listened carefully to the speaker and ignored his slides. Then I sat through the repeat session and looked at the slides. Even knowing exactly what he was going to say, I was unable to read both the slides and absorb his spoken message.

Another speaker at this conference apparently assumed we were speed readers — not one slide was displayed long enough to read it.

Vision tests

In many visual look like a test for 20/20 vision. In setting up for a presentation at a recent conference, a speaker projected a test transparency. As he was asking whether to reposition the projector to increase the size of the image, an attendee wandered in and emphatically said, "Yes! I can't stand another day of squatting."

One of the best presentations I've ever heard was a kind that is rare these days: a speaker who simply spoke. No slides, no as you can see on this chart . . . no picture-perfect power point. She talked. We listened. She was lively, dynamic and articulate. The presentation was informative.

Continued on page 22

No cause for gloom and doom in MIS education

READER'S PLATFORM

The two-part series, "Crisis in Education" (CW, June 15 and 22), paints too gloomy a picture of enrollments in business school-based MIS programs.

It is true that the number of students enrolled as undergraduate or graduate MIS majors has leveled off or may have declined at some schools. However, this plateau has occurred after a 10-to-15 year period of very high

The commentary was written by David Neumann, University of Minnesota; Jay Nunemaker, University of Arizona; James Sosa, Georgia State University; Ted Storer, New York University; and James Weicher, University of Minnesota.

growth. Today, as stated in the articles, more than 70% of business schools have established an area of concentration in MIS. Other programs are under development, with a substantial number preparing to begin operation in the coming school year.

Management information systems is a challenging area that requires a blend of formal academic courses. MIS majors must usually complete about one-third of their course work in information systems and the remainder in general business topics. The need for this mix of skills and broad background is well established. Certainly, most information processing managers realize technical expertise is not enough and that managerial knowledge and communication

skills are important ingredients for success.

In our experience, the demand by industry for MIS majors at both the undergraduate and MBA levels has never been stronger. Salaries paid to MIS graduates are comparable to, or exceed, those of graduates in other business functions, except, perhaps, for finance graduates from some institutions. Some firms do prefer to hire MIS MBAs with work experience, but this preference holds true for graduates from all academic areas. Many companies are paying tuition fees to help their employees major in MIS.

The total demand for MIS courses by both MIS majors and nonmajors is increasing. All accredited business schools are required to offer MIS courses for non-MIS majors. Such courses familiarize students with computer and communications technology and introduce students to management issues relating to

Continued on page 22

Talking

CONTINUED FROM PAGE 21

tive and interesting. No one seemed bored or confused by the absence of mystifying charts and rainbow-colored gibberish.

But in this age of instant graphics, speakers hardly ever just speak anymore. Visuals to accompany every 34 words have become de rigueur. You look at a chart with circles and arrows and listen to the paragraph describing each one.

If you follow the text of a prepared speech, chances are you would see a reference to a slide for every paragraph. More and more, the intent of the presentation seems to be to view the slides; the

talk itself is simply an embellishment.

Do visuals add anything to a business presentation? Sure they do. If they are designed and presented properly, they can help the listener understand, consolidate and remember what is presented. But that "if" is a big one.

Making the point

One step in the right direction would be to scrap word and graphic slides and use pictorial or whimsical slides, which make the point without needing to be read. I've been sold on this approach ever since I prepared a presentation for a company that had assigned a graphic designer to develop the slides that were to accompany my talk. This guy was a creative genius. I described my objectives for each

chunk of the presentation, and as fast I talked, he drew. He came up with cartoons, drawings and clever ways of conveying my message that were much more memorable than tiny text, bulletted items, bold numbers, cryptic charts or multi-colored glare.

It is easy to fall victim to the "I'll run off some slides on my way out the door" syndrome. We need to resist the laziness ease of use can cause and put more thought into overall effect. We need to get the wordiness and modified graphics out of our visuals. We need to let our own words do more of the talking.

For business presentations, visuals should enhance the talk, not the other way around. On the other hand, for a trip to the Galapagos...

Gloom and doom

CONTINUED FROM PAGE 21

the use of information technology in organizations. Students from other functional areas (marketing, finance and accounting, for example) are enrolling in MIS electives such as systems analysis and design, telecommunications, end-user computing and artificial intelligence at an increasing rate.

This demand translates into a need for additional faculty. Conservative estimates say the demand for MIS Ph.D.s exceeds supply by a ratio of at least six to one.

MIS as an area of research is too young to have established an overall theoretical model or a set of research paradigms much as those characterizing older fields. This fact sometimes makes it hard for tenure committees to evaluate MIS research.

However, the situation is improving because of the obvious importance of information technology in organizations and the many opportunities for interesting and important research projects. The high quality of the new Ph.D.s entering the field also contributes to the improving image of MIS.

The articles correctly state that information systems programs and facilities are under continual revision and enhancement. Huge sums of money have been invested by all major universities to build the infrastructure of equipment, laboratories and wide- and local-area networks that will be at the heart of the educational delivery process in tomorrow's university. Such investments are proving to be

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Planning for consecutive seminar dates

THE situation is improving because of the obvious importance of information technology in organizations and the many opportunities for interesting and important research projects. The high quality of the new Ph.D.s entering the field also contributes to the improving image of MIS.

both sound and effective.

Many MIS programs also have boards of advisors from industry that meet regularly to help faculty update their curriculum. Just as information systems requirements in industry continue to change, so must MIS faculty. MIS programs also have boards of advisors from industry that meet regularly to help faculty update their curriculum. Just as information systems requirements in industry continue to change, so must MIS faculty.

For example, the chief information officer concept implies that MIS programs need to broaden the domain of study to include multiple information technologies — end-user computing and telecommunications — as well as traditional data processing.

In summary, there is no need for gloom about the future of MIS programs. MIS is still in its infancy and has some shortcomings. But the achievements to date have been impressive, and we are in a good position to make a valuable contribution to industry in the foreseeable future.

SOFTWARE & SERVICES

SOFT
TALK



Jordan S. Wouk

Cobol 85 revisited

I've changed my mind. In the May 18 issue of Computerworld, I was correctly quoted as being unenthusiastic about the proposed addition of intrinsic functions to the 1985 Cobol standard. Since then, I have studied the addendum in greater detail and have discussed it with others. I now feel that the proposed addition contains some excellent features, a few of which I list below. I urge those interested to get copies of the document, read it thoroughly and let the ANSI X3 Committee know what they think. Comments must be in by August 10.

To me, the most significant productivity improvement is the ability to do certain functions against one or more entire tables without a loop. The feature can be used in the following functions:

- Determine the greatest or least value.
- Add up all the values.
- Point to the greatest or least value.

Several functions make the processing of input from terminals easier to handle. They include the following:

- Set all letters to uppercase or lowercase.
- Obtain the numeric value of an input string that may contain a combination of digits, spaces,

Continued on page 26

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Unix OA import invades U.S.

Europe-developed, multifunction package gains 35% share of market

BY MITCH BETTS
CW STAFF

SAN ANTONIO — A previously little-known office automation package for Unix systems has developed a loyal following among MIS managers on its way to capturing a 35% share of the U.S. market for Unix-based office systems, according to users and market analysts.

"The software developers are located in England and therefore [the package] is not too well known [in the U.S.] But it's catching on like wildfire in city offices here," said Robert Kay, director of information resources for the City of San Antonio, referring to Uniplex-II Plus, the standard OA package for all 27 city agencies, Kay said.

The product, a multifunction office automation package for Unix systems that debuted in February 1986, is offered in the U.S. by Dallas-based Uniplex Integration Systems, Inc., a unit of British firm Redwood International, Ltd. According to Dataquest, Inc. researchers, Uniplex leads the U.S. market in installed Unix OA software licenses with a 35% share, in close competition with R Systems, Inc. in Dallas and Quadrant Systems, Inc. in Sherman Oaks, Calif.

Taking the city

The city government of San Antonio plans to make Uniplex-II Plus the standard OA package for all 27 city agencies, Kay said.

Because of limited funding, the package is being implemented on an agency-by-agency basis, beginning with the public works and police departments, he said.

"The departments that are using it have been quite impressed, and the other departments are asking, 'When can we get on?'" Kay added. So far, the software runs on AT&T 3B2 and Pleux Computers, Inc. P/75

systems.

The product features word processing, spreadsheet, financial modeling, relational data base, electronic mail, a screen generator and graphics in an integrated package that employs productive data sharing and

Continued on page 25

Factory software revamped

BY ROSEMARY HAMILTON
CW STAFF

CHICAGO — A number of manufacturing software vendors rolled out revamped packages for Digital Equipment Corp. and IBM hardware at the Advanced Manufacturing Systems Exposition and Conference held here late last month.

System Software Associates, Inc. (SSA) in Chicago announced a file-conversion tool to lure users away from IBM's Manufacturing, Accounting and Production Information Control System (MAPICS) to SSA's Business Planning and Control System (BPCS). BPCS competes with IBM's MAPICS in the IBM System/36 and 38 arena.

The utility, scheduled for availability later this month, will be offered to new BPCS users at no charge, SSA said.

The vendor said its manufacturing system assists users in converting both static and dynamic data from MAPICS I files to BPCS. It reportedly allows users to create cross-reference files that match equivalent characters with differing key lengths between systems. Audit trails are generated for verification before making the conversion, the vendor said. After the conversion, the audit trail describes

Inside

- IBM joint marketing program offers independents' applications, Page 24.
- Micro Data Base Systems ports Guru to VAX, Page 27.

Light

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IBM sales reps to offer other vendors' software

BY CHARLES BABCOCK
CW STAFF

RYE BROOK, N.Y. — IBM recently launched a joint marketing program that will allow its salesmen to offer selected software applications from independent suppliers as part of a sale of its own hardware and software.

Called the Cooperative Software Program, the 13 initial selections include applications in accounting, manufacturing and construction.

IBM spokesmen said the prices listed were the same as those charged by the software suppliers.

Big-name software suppliers were notably absent from the list. There were no names equal to Hogan Systems, Inc., with which IBM signed a 20-year product licensing agreement for banking applications last year.

Sam D'Angelo, general manager of special products at Cadam Inc., said his firm's initiatives increased sales of its CADG Plus FM with the implicit IBM endorsement of its product. He said entering into the cooperative marketing agreement allows IBM to supply its customers quickly with products that have been proven in the marketplace. IBM collects a fee every time one of its salesmen makes a sale, he noted.

Use for Infowindow

Three laser videodisk instructional courses were included in the group of applications selected by IBM, indicating that third-party suppliers have been able to come up with useful implementations of IBM's Infowindow system, a personal computer-based videodisk system using a touch-sensitive screen.

Intelligent Images, Inc. in San Diego, for example, is supplying a library of videodisk courses on hospital emergency and critical care, called the Dxtor Clinical Simulator System, at \$1,695 per module.

Cadam is supplying CADG Plus FM, a host-based multiuser product for strategic planning and facilities management. It is priced at \$100,000 for the base module. The firm is also providing Basicad, an \$11,500 tool to allow user-defined macroinstructions to be written, executed and debugged from a Cadam terminal.

The state of Kentucky is supplying Project Vision, a \$1,995 interactive presentation of mathematical skills for first- and second-grade students.

R. C. Houlihan Associates, Inc. in Bayville, N.J., is supplying CMAS/Plus, a \$2,250 package for construction-management accounting that runs on a System/36.

Linton Shafer Computer Services, Inc. in Frederick, Md., is

supplying the \$3,850 Financial Reporting/General Ledger System for IBM's System/36 PC and the System/36 5360 at a price of \$5,200. Linton Shafer is also providing the Time Management System, a \$4,600 System/36 PC package for accounting firms to track staff time and

expenses by client. The same package is available on the System/36 5360 and 5362 for \$6,300.

Prism, a plantwide manufacturing planning and control system for the System/38 from Marcam Corp. in Needham, Mass., includes three modules

ranging in price from \$22,000 to \$28,000.

ON/2 is a set of on-line transaction processing modules for the IBM System/88 that supports many electronic funds transfer and message-switching applications. It is supplied by Shared Financial Systems in Dal-

las and costs \$75,000.

Action 2000 is a line of transaction-processing software for financial services and retail industries supplied by the Irving, Texas-based Mitch Electric Banking Division of Momentum Co. The mainframe-based package is priced at \$275,000 for a package driving automated teller machines and at \$200,000 for a switching package.

DBMS

FROM PAGE 23

acle Corp., Relational Technology, Inc., Sybase, Inc. and Tandem Computers, Inc. "No one is shipping products," the report claims.

In addition, the Forrester report predicts that what it calls the early four firms will not be

able to meet their aggressive delivery schedules.

"The greatest growth for distributed data bases will be the 1990 to 1992 period, sustained by the announcement of IBM's distributed DB2 product late in 1990," the report claims.

At the same time, a third-generation IBM Personal Computer operating system for machines based on Intel Corp.'s 80386 mi-

coprocessor will improve the viability of distributed data bases on PCs and local-area networks, the report says.

Slow but steady

The Forrester report contends that the remainder of the 1990s will see a steady but slow increase in the use of distributed data bases and multivendor environments, the Forrester report concludes.

This increase will be fueled by

companies that are attempting to build corporatewide information architectures using distributed data bases.

The increase in the use of distributed data bases will, in addition, be driven by late adopters that are resorting to distributed data bases to handle large data bases and multivendor environments, the Forrester report concludes.

Unix OA

FROM PAGE 23

windows. In addition, the package uses a generic command system, soft keys and pop-up menus to make it easy for office workers to use.

The relational data base manager uses the C-ISAM data structure from Informix Software, Inc., in Menlo Park, Calif., and is fully compatible with data bases developed under Informix-SQL, a relational data base management system (DBMS) for application builders, and Informix-4GL, a fourth-generation programming language.

The price of Uniplex-II Plus is based on processor size; the price for the AT&T 3B1 version is \$1,300.

Data integration cited

Key cited the product's data integration and user interface as key reasons for his choosing Uniplex-II Plus as San Antonio's standard office automation package.

Likewise, Andrew Bennett, director of MIS for the Regional Transit Authority of New Orleans, said he has adopted the Uniplex package for use on AT&T 3B1 and 3B2 and Plexus P75 systems that will soon support 96 terminals.

Bennett said earlier versions of the product had several software bugs and integration problems, but the Uniplex-II Plus version introduced at the UniForum 1986 trade show had eliminated the problems.

But Bennett said that the user manuals still need improvement. "The manuals are the weakest part of the package. I understand they've been rewritten, but I haven't seen the new version," he said.

Data base access

One attractive feature of the DBMS in Uniplex-II Plus, Bennett said, is its compatibility with Informix-SQL and Informix-4GL. In essence, the interface gives users direct access to Informix data bases through their familiar Uniplex screens and menus, he said.

"I like the ability to modify the menus and change them to meet user needs for access to particular types of data," Bennett added.

The OA software also runs under Unix-like operating systems for the IBM 370 IX, IBM Personal Computer AT and RT PC, as well as several other hardware lines.

Uniplex recently announced modules that allow users to exchange documents with systems that employ IBM's Document Content Architecture and the U.S. Navy's Document Interchange Format and is expected to announce additional document-exchange programs this year.

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ABOVE THE NEED.
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 CONTROL DATA

Cobol 85

CONTINUED FROM PAGE 23

commas, decimal points, dollar signs and plus or minus signs.

- Reverse the contents of a field to help count the number of trailing blanks and determine the trailing delimiter.

- The Modulo function, sometimes used as a remainder function, makes it simple to test for odd or even.

- Date and time of compilation and current date and time are important for control and audit.

- Four date-examination functions support both year/month/day and Julian calendar formats. The functions can help with date calculations, particularly with

those related to the year 2000. Other functions include infinity, factorial, pseudorandom numbers and trigonometric and logarithmic functions. And there are more.

Adding these functions to Cobol will result in increased productivity for at least two reasons. First, while some of the facilities are available in existing environments, making them part of standard Cobol will enhance the portability of programs and reduce the learning curve when programmers go to different environments.

Second, the addendum defines a group of commonly used general-purpose routines. By having these routines widely available, debugged and well documented, a programmer can spend a greater

portion of effort on the application-specific logic.

My strongest objection to the proposed additions is that they are limited in scope. Many completely compatible enhancements and features have been developed for Cobol but are not addressed in the addendum. A brief sampling includes the following:

- Comments on the same line as source code.
- A concatenation operator for literals, instead of the awkward continuation.
- Set 88-level condition name TO FALSE.
- Dollar signs and commas in numeric literals to enhance readability.
- Floating-point data.

Other facilities have been developed

that are compatible except for the addition of one or more reserved words. Some are listed here:

- EXIT PARAGRAPH and EXIT SECTION, which are part of a structured language.
- A very powerful validation facility.
- Defined intermediate results, which are desperately needed to ensure correct and consistent results in arithmetic expressions.

Those who want to find out what has been developed for Cobol can contact the chairman of the Conference of Data Systems Languages' Cobol Committee, Don Nelson, at Tandem Computers, Inc., MS 100-05, 10555 Ridgeview Court, Cupertino, Calif. 95014.

Work is vice-president for quality assurance at the Bank of New York and observer of the X3/4 Cobol Committee of the American National Standards Institute.

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CONTINUED FROM PAGE 23

the fields that were converted and their equivalents in BPCS.

SSA also added two modules to BPCS that it said will available this month. BPCS/BIR is a report generator that the vendor said will be licensed for \$8,000 for the System/38 and \$3,500 for the System/36. BPCS/Payroll will be offered as a stand-alone financial package or as a component of the manufacturing system, SSA said. It costs \$12,000 for a System/38 license, \$6,000 for a System/36 license.

Ach Computer Systems, Inc. in Los Angeles, Calif., added lot-tracking and reporting module to its Material Information System for DEC VAX systems. Massman/Tracker is said to provide users with information on where materials are located through the various phases of the manufacturing process and to alert users when materials expire. In addition, it provides three levels of security: open, restricted and no access. Prices range from \$16,875 to \$37,500, depending on the DEC hardware, the vendor said, and it is currently available.

MCBA in Glendale, Calif., said it will begin shipping the job-costing module of its VAX Cobol series for DEC hardware this month. The vendor currently offers three modules — Shop Floor Control, Bill of Materials and Inventory Management — as its manufacturing resource planning system, which it said will eventually consist of 18 modules. The software was designed to track and analyze manufacturing costs and compare actual costs with estimated costs. Licenses start at \$4,000.

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subproject groups, tasks and other site-defined entities. Features include live data capture and reporting of royalty program execution, disk space and batch and print jobs and interactive sessions. Network communication servers provide automatic network job accounting and a checkpoint-restart capability prevents the loss of any accounting data in the event of a system crash.

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MICROCOMPUTING

SMALL TALK



William Zachmann

A pocketful of miracles

One of the best kinds of innovation is an idea that is so good that, afterwards, it hardly seems possible everybody wasn't doing it already. Plus Development Corp.'s hard-disks-on-a-chip project are an excellent example.

The Pocket Modem from Imagine Village, Nev.-based Migen Software, Inc., is another. Weighing in at only 9 ounces, the Pocket Modem offers 300 to 1,200 bit/sec. Hayes Microcomputer Products, Inc.'s competitive modem capabilities in a 1.3- by 2½- by 5-in. unit that looks like it ought to be on display at New York's Museum of Modern Art.

With surface-mount internal engineering to match its exterior industrial design, the Pocket Modem is not only a terrific product for use with portable systems, but also a first-class alternative for stationary personal computers. It plugs directly into a 25-pin RS-232 communications port or can be connected to a nine-pin IBM Personal Computer AT-type port.

Continued on page 33

Microsoft marketeer speaks out

Brings to fore push for applications turf, common graphics interface

As director of applications marketing for Microsoft Corp., Jeff Raikes is responsible for that company's highly aggressive push into the applications market.

Microsoft, best known for its languages and operating systems, is preparing to go after areas currently staked out by its rivals, including domain data base vendor Ashton-Tate and spreadsheet kingpin Lotus Development Corp.

Computerworld Senior Editor Douglas Barney recently spoke with Raikes about the still-unannounced IBM Personal

Computer and compatible version of its Excel integrated spreadsheet, along with its strategies for the application marketplace and the hoped-for emergence of a common graphics user interface for PC software.

What advantages will PC Excel have over a graphics-based version of Lotus' 1-2-3?

That is pretty hard to say, given that there hasn't been any announced information on what 1-2-3/G would be.

One of the advantages Micro-

soft will have is that since that we believe in the move toward a graphics user interface, we are supporting it right away.

Lotus is actually putting people off and trying to get them to go to another character-user interface version, the old user interface, before they go to the new interface.

We will be on the new standard user interface long before Lotus will with our Windows version, and then move to the Presentation Manager. These products will have the same look and will be [IBM] Systems Applications.

Continued on page 32

Business decisions disclosed

BY ALAN J. RYAN
CW STAFF

PHILADELPHIA — The business decisions of America's top corporate leaders are something few of us are privy to, but a new software package from Reality Technologies is aimed at changing this situation.

The software, called Business Week's Business Advantage, is said to allow users to make business decisions based on actual case studies that have been reported in *Business Week* magazine.

Through the simulation software, the user reportedly faces the same decision-making situations as industry giants, according to company President Mark Geddes.

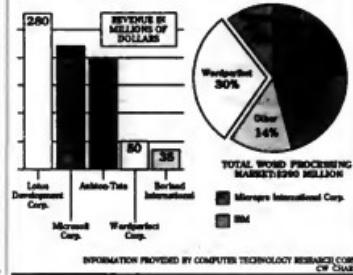
The software program provides the user with information about the company's operating environment, which includes facts on competitive products, market share and strategic positioning and economic and industry trends.

Continued on page 30

Inside
a Micro Focus chips Cobol development kit for PC-DOS, OS/2, Page 34.
a 32/32 Data Systems sees its way clear to adding slide package for Mac, Page 34.

Data View

Wordperfect's rise to the top
Wordperfect pulled into fourth place among software companies in 1986 and gained the top spot among word processing vendors



Continued on page 33

Slow that PC down!

BY ALAN J. RYAN
CW STAFF

DEDHAM, Mass. — While most new microcomputer hardware products hype vast increases in processing speed, a utility from Soft-Sense appears to be bucking that trend by putting the brakes on the fast processors.

The product, called Pacer, was designed to slow the speed of fast microcomputers like the IBM Personal Computer AT and compatibles operating under Microsoft Corp.'s MS-DOS. The utility reportedly can make the Intel Corp. 8088, 80286 and 80386 processors operate as

Continued on page 33

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Micro Focus launches Cobol development kit

BY ALAN J. RYAN
CW STAFF

PALO ALTO, Calif. — To help launch its new generation of Cobol technology, Micro Focus, Inc. last week began shipping its Cobol/2 Software Development Kit, targeted at IBM PC-DOS

and OS/2 applications.

Included in the kit is a Cobol/2 compiler, a visual debugging tool, an extended-memory program for writing protected-mode applications under PC-DOS and an editor.

With the tool kit, users with

Personal Computers and compatibles now who want to convert them to OS/2 stand a good chance of having the applications completed when IBM rolls out OS/2, Micro Focus said. It is unlikely, however, that entirely new applications would be available to run on OS/2 that quickly.

"It's not impossible, but it would be difficult to get the application coded, tested and out on time," said John Beggs, market development manager at Micro Focus.

Key to the technology is the kit's compiler, which supports nine Cobol dialects, according to

Beggs. The compiler reportedly offers maximum flexibility to a developer who wants to bring existing Cobol code from a non-PC-DOS environment.

By using Micro Focus Cobol standards as a vehicle, programmers can migrate Cobol source code from the mainframe to the personal computer and on to Unix- and Microsoft Corp. Xenix-based machines running Micro Focus Cobol, the vendor said.

Cobol/2 compiles ANSI-standard Cobol 74 and Cobol 85, IBM mainframe OS/VS and VS Cobol II, Micro Focus Level II Cobol, Ryan-McFarland Corp. M/Cobol, Data General Corp. Interactive Cobol, IBM PC Cobol Version 1 and IBM's Systems Application Architecture.

The compiler eases the task of migrating Cobol source code through its 32-bit addressing architecture, the vendor claimed. As a result, large mainframe programs that have been unusable on personal computers without extensive reworking can now be transferred to the micro and compiled intact.

Another component of the tool kit is XM, which the vendor said adds the ability to use extended-memory facilities to reach beyond the 640K-byte boundaries of PC-DOS.

The Software Development Kit can be ordered by developers through July 31 for \$1,500, Micro Focus said. The compiler with the Animator debugger sells separately for \$900.

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Business

FROM PAGE 29

By manipulating the information, Reality Technologies said, the user attempts to strategically manage the company for a period of one year, as simulated by the program.

Business Advantage incorporates a 400-rule expert system, posting results and explanations so the user can see how his strategy affected sales, return on investment and profits.

Goldstein said the lessons in management can be applied to any business. The program is currently available for use on IBM Personal Computers and compatibles and is scheduled to be available for Apple Computer, Inc.'s Macintosh later this summer.

The software is available through Reality Technologies and will be distributed to retail channels by Broderbund Software.

List price is \$49.95, and case studies include Lee Iacocca, chairman of Chrysler Corp., and Rod Canion, chairman of Compaq Computer Corp. A one-year subscription featuring a new study each month costs \$299.95.

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CONTINUED FROM PAGE 29

tion Architecture [SAA] user interface-compliant.

Should users consider PC Excel as part of their purchasing plans?

Just as people are considering IBM PS/2s and that kind of high-performance hardware, they should also be looking at the high-performance spreadsheet, Excel, that will take advantage of that hardware to provide a new level of performance in spreadsheets.

What do you think about 1-2-3/M, the mainframe version of 1-2-3, which may be an effective way to consolidate data?

One of the overlooked weaknesses in the 1-2-3/M strategy is that it is not an SAA user interface-compliant product. It is a little weird to have Big Blue out there selling the user interface anarchy as opposed to SAA. I think what is likely to happen is that the companies that are already strong in mini and mainframe spreadsheets will move quickly toward SAA user-interface compliance. Then what advantage does Lotus 1-2-3/M really have?

Customers are particularly interested in things like consolidation, and there may be superior ways to consolidate information. In some sense, you can say PC Excel is likely to work just as well, maybe even better, in terms of being consolidated by 1-2-3/M. We supported the WKS format, both read and write, in Microsoft Excel for the [Apple Computer, Inc.] Mac, where [Lotus's] Jazz didn't even support that.

What do you think IBM's goal is in the applications market? Do you expect to compete with them?

Today, they have not been a force in the applications side of the business. They have really focused in on the systems side of the business, and that makes sense. I expect that they might try to change that at some point in the future, but it is pretty hard to compete with this young, aggressive, independent software community.

Are there any advantages to also being a languages and systems software company?

Absolutely. Our strength in those areas does help the applications side of the business.

In particular, what helps is the close working relationship we have with hardware manufacturers — the fact that we are working with them and sometimes even influencing the directions that they are going in. That kind of vision helps us a great deal. But a lot of it is not so much knowing it, but putting it together.

Why haven't we seen Windows applications from Microsoft?

Software development is a little bit like a production process — not like hard goods, where you can see the smokestacks. We have a major investment in graphics user-interface software, and sometimes it isn't as visible as you might expect.

Is Microsoft interested in true multiuser applications in the style of minis and mainframes, or is local-area network [LAN] the way to go?

We feel that the 386 in particular provides a very strong foundation for a server. You will see LAN environments where the 386 is a server, a [Digital Equipment Corp.] VAX or Microvax is a server or an [IBM] 9370 is a server. In the long run, some of the advantages of the 386 — in particular its open architecture — will make that the dominant server.

You will see these other environments, in particular the VAX and 9370, but beyond that, I wouldn't paint a bright future for minicomputers as servers. They will continue to have their role as small host computers. That is part of the reason why

Microsoft is oriented toward the networked environment as opposed to the host-software approach.

How are you going to tie all your applications together? Are you planning a common data structure?

We are looking at supporting common data-exchange protocols, in particular DDE, which needs to be extended to work across networks. The problem with trying to have common data structure underlying all applications is that the data structure required to build a great spreadsheet is different from that required to build a

great database or word processor.

Will you write for the OS/2 kernel and then the Presentation Manager, or as many vendors are planning?

The ones writing for just the kernel are doing it backwards. The winning approach is to do the Windows applications and then take them to the Presentation Manager.

If you just try to go for OS/2 — for example, just introducing a spreadsheet that has the same interface — you are continuing in the world of user-interface anarchy. What corporate accounts want to move toward is the standard user interface, which is Windows 2.0 and OS/2 Presentation Manager.



Microsoft's Reikes

Nick
Edwin
Paul

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Karl, Edwin, Nick and Paul were recently honored for their accomplishments by being made IBM Fellows. For the next five years they'll be given the freedom to pursue projects of their own choosing.

Karl Hermann improved the manufacturing techniques of printed circuit boards, and created methods for assembling and testing computer circuits that ensure the quality of IBM products.

Edwin R. Lassette conceived efficient software designs that

Pocketful

CONTINUED FROM PAGE 29

with a short adapter cable.

The phone line plugs into the other end of the Pocket Modem via a standard RJ11 modular phone jack. A second RJ11 extension jack on the back of the Pocket Modem can be used to attach a telephone. The Pocket Modem can be run for up to 12 hours powered by a 9V transistor radio battery or, alternatively, can plug into a wall socket through an AC/DC power converter.

The \$259 list price for the Pocket Modem includes the converter, a 25-to-25-pin extension cable, the 25-to-nine-pin adapter, a 7-ft. RJ11 to RJ11 tele-

phone cable and a 9V battery.

The Bitcom communications software bundled with the Pocket Modem gives you everything you need for personal computer data communications. Included are ANSI color and graphics, Digital Equipment Corp. VT100 and VT52 terminal emulation and IBM 3103 emulation capabilities.

Being Hayes-compatible, the Pocket Modem also works with widely used communications software for IBM and compatible systems such as Microtuf, Inc.'s Crystalks and Hayes' Smartcom.

I did encounter minor initial glitches in using the Migenet Pocket Modem. The SETUP program that came with it wasn't working properly, and neither it nor its problems were documented. This

program was intended to be used in setting switches in the nonvolatile enhanced erasable programmable read-only memory of the Pocket Modem. These are instead used of physical DIP switches.

Going to work:

Initially, I had some problems getting the Pocket Modem to work in Hayes' Smartcom in my office. The problem was a result of the factory defaults on the Pocket Modem being set for pulse dialing. Although I had told Smartcom, via its configuration screens, that I wanted tone dialing, it wasn't happening.

Once I realized that Smartcom's modem-initialization routine expected a tone-dialing default setting, the path to the solution was clear. I simply needed to

change the soft switch in the nonvolatile memory of the Pocket Modem. The question was, How?

The nonfunctional character of Migenet's SETUP program didn't help matters. By talking to the Pocket Modem through Migenet's Bitcom program, I eventually figured out how to configure the Pocket Modem so that it would work with Hayes' Smartcom.

Despite the glitches, which I suspect might lead a traditional reviewer to chalk up some bad marks for Migenet's documentation and technical support, I have no hesitation recommending the Pocket Modem for anyone who wants a good buy in a remarkably portable and usable 300 to 1,200 bit/sec. modem. The basic product is excellent and, once I figured out how to use it, did its job very well.

Companies relatively new to a market don't always get it perfect the first time around. Although Migenet still has a bit of sorting out to do, the product looks to be a winner, and I expect that Migenet will have no difficulty in correcting its problems.

Migenet's Pocket Modem has already bred a number of imitators, just as Plus Development's Hardcard did one year ago. In both cases, imitation is undoubtedly a testament to the excellence of the innovative idea behind the product.

Zachman is vice-president of research at International Data Corp.

Slow down

CONTINUED FROM PAGE 29

much as 600 times slower than normal, according to the vendor.

The usefulness of this type of utility comes into play when running software written for slower personal computers that will not perform properly on faster machines, the firm said. Some software copy protection schemes, in particular, wreak havoc when run at faster clock speeds.

Other uses, the vendor claimed, include debugging and reverse-engineering graphics screens, windows and menus by running them in slow motion to see their formation pixel by pixel, allowing programmers and reviewers to see how software will run on all classes of machines without actually having those machines and playing games written for 4.77-MHz machines that are not playable at 8 MHz.

Pacer occupies 3.4K bytes of active memory and was written in machine language. Screens can be chosen by using a hot-key sequence, and the keyboard can be run at normal speed while the processor runs at another, according to a Soft-Sense spokesman. Pacer will sell for \$49.95 and is available through the vendor.

simplified data processing on many of IBM's larger computers.

Nicholas J. Pippenger invented the theory used to identify problems that can be solved efficiently by parallel processing.

And Paul A. Totta made possible many advances in semiconductor metallurgy that significantly contribute to the reliability and performance of IBM computers.

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NEW PRODUCTS

Systems

Advanced Logic Research, Inc. (ALR) has announced four models of its ALR 386/2 IBM Personal Computer AT-compatible system based on the Intel Corp. 80386.

The Model 10 features an ALR-designed 386 system board with 1 MB of 32-bit random-access memory (RAM) expandable to 2 MB bytes; 1.2-Mbyte floppy disk drive; one serial port; one parallel port; and a 101-key expandable keyboard. The ALR 386/2 Models 40, 80 and 130 all feature hard-disk drives of 40MB, 80MB and

130MB bytes, respectively; 2MB bytes of 32-bit RAM; and a hard-disk controller with on-board full-track disk caching.

Prices for the ADR 386/2 family range from \$1,990 to \$7,299.

Advanced Logic Research, 10 Chryslar, Irvine, Calif. 92718.

Software applications packages

A color slide software package that is said to allow users of the Apple Computer, Inc. Macintosh personal computer to create 35mm slides and overhead transparencies from MacDraw files has been intro-

duced by 20/20 Data Systems, Inc.

Carousel is a free-form slide creation package featuring a selection of 256 colors, gradient color-mapping techniques and simplified text placement. Once the slides are designed, turnkey processing is handled via a 24-hour modem connection to Stokes Side Services, Inc. in Austin, Texas. Slides with 2,000-line resolution are available for \$7 per slide, slides with 4,000-line resolution cost \$14 per slide.

The Carousel package costs \$295.

20/20 Data Systems, 7000 Cameron Road, Austin, Texas 78752.

Software utilities

A hard-disk backup utility for the Apple Computer, Inc. Macintosh has been an-

nounced by Design Software, Inc.

DS Backup is said to permit users to copy the contents of a Macintosh hard disk to a set of floppy disks or to another hard disk drive. The utility runs on all Macintosh computers and most Macintosh compatible hard disks. According to the vendor, it can backup data from one Macintosh to another across Apple's Appletalk network.

Up to 100 files can be backed up and restored an entire hard disk, selected directories and files, or just files that have been changed since the last backup session.

DS Backup is priced at \$79.95.

Design Software, 1275 W. Roosevelt Road, Chicago, Ill. 60615.

Software enhancements

Mortice Kern Systems, Inc. has enhanced its MKS Toolkit, software designed to provide the personal computer user with the power of Unix commands within a Microsoft Corp. MS-DOS environment.

The tool kit is a package of more than 110 utilities. Version 2.2 features a complete implementation of the VUEX full-screen Unix editor with the capability of handling international character sets including French, German and Spanish.

Other features include an implementation of AT&T's Unix System V Korn shell and an enhanced version of the AWK fourth-generation language as well as utilities for data compression and file encryption.

MKS Toolkit: Version 2.2 costs \$139.

Mortice Kern Systems, 43 Bridgeport Road E., Waterloo, Ont., Canada N2L 2J4.

Printers/Plotters/Peripherals

Cordata Technologies, Inc. has reduced the prices of its Intellipress electronic desktop publishing systems, its Desktop Printshop laser printers and its line of 80286-based personal computers.

The Intellipress, fully integrated systems offered with either Xerox Corp.'s Ventura Publisher or Aldus Corp.'s PEG Pagemaker preinstalled on hard disk, now cost \$8,995. An optional scanner costs \$1,495. The LP-300 Desktop Printshop laser printer was reduced by 27% from \$2,995 to \$2,195. The LP-300X was reduced by 30% from \$3,895 to \$2,695.

The PCs now cost from \$1,895 for the ATP-8-Q to \$2,495 for the ATP-8-QD.

Cordata, 20001 Corporate Center Drive, Newbury Park, Calif. 91320.

Board-level devices

STB Systems, Inc. has introduced the Color/Mono video adapter.

The dual-purpose Color/Mono adapter is said to support IBM Color Graphics Adapter modes as well as IBM Monochrome Display Adapter modes. The switch-selectable adapter also provides an IBM-compatible parallel-printer port and an optional battery-operated clock/calendar.

The adapter supports graphic resolutions to 640 by 200 pixels in two colors and 320 by 200 pixels in four colors.

The Color/Mono adapter is priced at \$149. The clock/calendar option costs \$29.95.

STB Systems, Suite 210, 1651 N. Gleannville, Richardson, Texas 75081.

JULY 6, 1987

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With a 150 Meg. 18 MS hard drive	
and standard chassis	\$5,899

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The Turbo EGA Color System

The above system with the following substitutions:

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The EGA High Resolution Monitor
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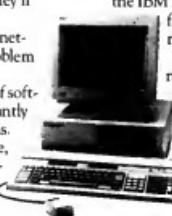
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Marvin Chartoff

X.25 nets to come of age

Products in the CCITT X.25 packet-switching market will undergo major changes in the next few years in order to respond to the growing sophistication of data communications managers and the evolving networking requirements of the user community.

These changes include the integration of packet-switched networks with other wide-area networking media as well as with higher level communications protocols, such as IBM's Systems Network Architecture (SNA) and the Open Systems Interconnect (OSI) communications standard. Behind these developments is users' growing desire to manage all components of their wide-area networks as one system and to use packet-switched networks at a cost-effective link between local, intra-site networks.

More and more corporations are using X.25 networks as a way to link SNA systems with devices that use asynchronous and other non-SNA communications protocols. And while OSI implementations are primarily local-area networks now, wide-area packet-switched networks such as the Defense Data Network (DDN) and other government networks will be required.

Continued on page 42

pany. "We don't have needs that are flashy enough to convince top management about big savings; printer sharing is our only justification right now," Winter says. "Executives do not use PCs and are not technology-minded, so we have to find our own funding."

This means tackling a LAN purchase onto an already-approved word processing acquisition. In turn means keeping costs to a minimum, at least initially. Once the network is in place, however, Winter says his group hopes to add other useful applications, such as moving documents between dedicated word processors and IBM Per-

sonal Computers, micro-to-mainframe access, simple file sharing and electronic mail.

Reportedly the world's largest wholesale merchandise market, Dallas Market Center holds a number of trade shows "that require a huge amount of direct mail," Myers notes. Users in charge of mailings for a given show could use the network for shared access to files and a laser printer, so that the company could start doing the mailings in-house "instead of having to farm them out to direct services for thousands of dollars, as we do now," Myers explains.

The network could also pro-

Continued on page 43

The ABCs of networking

MIS battles budget constraints, product overkill on first LAN project

BY ELISABETH HORWITT
CW STAFF

DALLAS — In the throes of its first local-area network (LAN) installation, Dallas Market Center Co.'s MIS department is finding out how tough it can be to explain to vendors what exactly it wants, especially when it has an economy-minded senior manager looking over its shoulder.

Michael Winter, vice-president of the firm's information services group and Microsystems Consultant Cookie Myrs' are using a cautious bordering-on-sneaky approach to purchasing a LAN for their com-

pany. Satellite transponder space, resulting in lower bandwidth prices, and climbing leased-line rates that forced users to seek inexpensive alternatives.

According to the Link report, VSATs are the fastest growing segment of the data broadcasting equipment market, which supplies low-cost alternatives to leased-line and dial-up services for one-way, point-to-multipoint data delivery. Two other segments are digital microwave dishes and equipment for transmitting over the FM-Subsidary Communications Authority frequency. The total market, currently \$1.5 billion, will grow more than 25% annually to \$3

Continued on page 43

Study: VSAT numbers, features grow

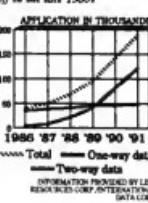
BY ELISABETH HORWITT
CW STAFF

The very small-aperture terminal (VSAT) satellite networking market is undergoing a shakeout as it moves into a new generation of value-added products, according to a recent report by New York research firm Link Resources Corp.

VSATs are small satellite earth dishes that approximately two years ago helped revitalize the satellite communications market by providing corporations with a cost-effective way to link a central site to remote offices. Other contributing factors to an upswing in satellite networking sales were a glut of

Satellite networks going interactive

Two-way satellite terminals installations are expected to take off in the late 1980s



PCs can do LU6.2 on Irma

LAGUNA HILLS, Calif. — Network Software Associates, Inc. recently introduced software products said to allow IBM Personal Computers and compatibles equipped with Digital Communications Associates, Inc.'s Irma boards to communicate via IBM's LU6.2 and RJE protocols.

Adap3274 LU6.2/1 is said to allow the PC to communicate with a mainframe using LU6.2 Advanced Program-to-Program Communications functions via an IBM 3274 or 3174 cluster controller.

Adap3274 RJE/I emulates an IBM 3770 RJE workstation. It reportedly allows Irma-equipped PCs attached to a 3274 or 3174 controller to communicate with an IBM mainframe running ES, Power or another VTAM operating system.

Adap3274 LU6.2/1 costs \$485. Adap3274 RJE/I costs \$985. Both products are available now.

Inside

- Synoptic adds 10Mb bit/sec. Ethernet to LatticeNet family. Page 42.
- Lanstar announces Ethernet-compatible document-management net. Page 44.
- Applied Voice Technology rolls out modular voice- and call-processing system. Page 44.

COBOL with network support now a standard feature. Complete networking syntax in new Micro Focus products.

Networking is a standard feature of Micro Focus' latest products, VS COBOL Workbench 2.0 and Micro Focus COBOL/2. The support includes record and file locking and shared files across the network. It supports the industry standard NETBIOS.

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fastest in the industry providing high performance applications. Micro Focus COBOL/2 is available in a Software Development Kit which includes a COBOL editor, Panels™ - a window creation facility and XM™ - extended memory support to allow the development and testing of applications using

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X.25 nets

FROM PAGE 47

by the Government Open Systems Interconnection Procurement specification to provide full support of OSI protocols in the future.

However, packet switches may need added throughput and bandwidth capacity to meet these demands. SNA adds control overhead, and the steady-stream nature of synchronous communications puts an added load on a switch, as does the additional overhead represented by OSI packet headers.

Some vendors, such as Teleset Communications Corp. and BBN Communications Corp., are moving toward integration of packet switches with T1 switches that support 1.5M bits/sec. date rates. One emerging application is for a packet assembler/dissassembler (PAD) to be hooked up to a T1 multiplexer so that X.25 packets can be sent along one or more subchannels within a T1 link.

Packet switches are being integrated with a variety of other networking devices, including satellite terminals and low-speed modems. But while users gain functionality, they also need a system that provides access and error control, monitoring, dynamic bandwidth allocation, statistics gathering and other network management functions across disparate communication devices.

Today, many corporate networks consist of a wide variety of vendors' multiplexers, modems and switches — each with its own proprietary network management system. As a result, the network control center quickly becomes a data center itself. With the addition of a packet-switch network, another network management system is added.

Because the packet switches are the most ubiquitous components of the network, the X.25 packet-switching network management system should be the central core of a network control center, integrating the network management information from modem-diagnostic and performance-monitoring systems and host-based network management. With all relevant network status information being collected at a central point, finger-pointing is reduced and the opportunity to incorporate artificial intelligence into the network control center becomes a very real possibility.

The broadening role of the packet switch in corporate networking is both a potential boon and a threat to vendors, whose products will have to support the increased throughput, bandwidth and network management integration. As systems integrators, vendors will need expert knowledge of a

wide variety of transmission and network management systems. Thus, we can expect a weeding-out of many smaller packet-switch vendors that will not have the resources to meet the demands of an increasingly sophisticated market.

Chartoff is a group manager at Fairstar, Va., consulting firm Network Strategies, Inc.

Firm extends premises-wiring family

MOUNTAIN VIEW, Calif. — Synoptics Communications, Inc. has broadened its Lattinet product family to include a 10M bit/sec. Ethernet over fiber optics and a concentrator for small work groups.

The expanded Lattinet product family provides a flexible,

cost-effective premises-wiring scheme that allows the use of both fiber optics and twisted-pair wiring to connect large and small work groups within a building, the company said.

The wiring system provides up to 32 connections in a Synoptics Premises Concentrator. The

smaller Departmental Concentrator, which connects small work groups to an existing Lattinet, supports up to 12 fiber connections or up to 18 connections of shielded twisted-pair cabling conforming to the IBM Cabling System specifications. Both products are available now.



VSATE

FROM PAGE 41

billion by 1990, Link estimated.

Last year, the VSAT market lost two major potential customers when Federal Express Corp. pulled out of Zapnet and the IBM-Merrill Lynch & Co. Inmet venture folded. However, "the current woes in the VSAT mar-

ket point less to a lack of legitimacy than to necessary growing pains in a very competitive market for carrying data traffic," the report states.

With the "virtual saturation" of the market for one-way VSAT dashes, vendors are moving into interactive and value-added niches, according to the report. Interactive VSAT networks emerged last year as cost-effective

vehicles for applications such as credit-and-debit-card retail systems and hotel and travel reservation services.

Interest growing

Equatorial Communications Co., a pioneer in one-way VSAT networking services that suffered heavy losses when the demand for those services declined, recently announced

several sales of two-way VSAT offerings. Federal Express has purchased a stake in Trident Corp., an Atlanta-based two-way satellite networking company that targets the financial service market.

The VSAT market recently received the mixed blessing of two powerful entries: AT&T, with its Skynet service, and GTE Corp. subsidiary GTE Spacenet

Corp., which recently won a \$40 million contract to build a 2,000-site system for K Mart Corp. AT&T, whose low-priced initial offering drew accusations of cross-subsidization from its competitors, has had comparatively little impact on the market, according to Link. GTE Spacenet, however, is becoming the preferred provider of VSAT transponder capacity, Link said.

ABCs

FROM PAGE 41

vide a shared mainframe host gateway for financial analysts on PCs, according to Winter. The group continues toleaning toward a network based on RS-232 ports, handling data rates in the 1M to 4M bps range that costs between \$1.00 to \$300 per workstation. A twisted-pair network is the preferred medium, since "I can't justify coaxial cable-based networks...as a way for someone to get at a printer," Winter notes. Currently under consideration are AT&T's Starlan and Western Digital Corp.'s twisted-pair network.

Since the company currently is looking to either Xerox Corp. or CPT Corp. for its new word processing systems, Winter says he was interested to learn that both of those vendors' products provide file sharing across a network. Having to buy "a big, expensive server" separately would be hard on his budget, Winter says.

However, not all vendors were as encouraging when Winter explained his needs. One told him that he would need \$50,000 just to start. Failure to find one source for his company's networking needs has not discouraged Winter, however: "Everything is gateways, we'll just have to tie several vendors' products together," he says. "We're not expecting one-button functionality to get from a PC to a word processor or to a mainframe, but neither are we going to settle for something that requires 50 manuals."

The number of networking products and options available is "a serious problem" for Myers. "Every time I read about yet another LAN introduction, I want to scream," he says.

While the company is an IBM mainframe shop, and Winter has talked with IBM about networking, he says he feels confused about the company's networking direction. "I have a Systems Network Architecture network with terminals all over, but it's hard to see where the new SNA products fit into the picture," Winter says. "The need for true-peer-to-peer communications for us could be five or 10 years away. I figure we'll make a small investment today in twisted-pair and let the big guys fight out the standards."

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NEW PRODUCTS

Local-area network hardware

An Ethernet-compatible electronic document management network, I/Net, has been introduced by Logodata, Inc. for use with its Laserview electronic document management system.

I/Net provides multiple access to optically stored electronic document images and uses a single high-resolution monitor to display both documents and data. It is Ethernet-based and compatible with personal computing networking hardware from 3Com Corp.

I/Net is implemented using dual file servers. The data base files reside on a magnetic-disk server. The digitally stored document images reside on an optical-disk server.

Laserview systems start at \$50,000. Logodata, 10 Technology Drive, Lowell, Mass. 01851.

Network management

A secondary-channel data service unit (DSU) aid to provide network management capability has been introduced by Universal Data Systems.

The DDS-2 96's primary channel

provides a user with full-duplex, synchronous end-to-end digital transmission at rates of 2,400, 4,800 and 9.6K bit/sec. It accepts both synchronous and asynchronous data. An independent, asynchronous secondary channel operates at data rates of 300, 150 or 110 bit/sec.

The DSU is connected to the network over a four-wire unshielded twisted-pair cable. It can be used in point-to-point or multipoint applications.

The DDS-2 costs \$750.

Universal Data Systems, 5000 Bradford Drive, Huntsville, Ala. 35805.

Network services

Western Union Corp. has instituted a communications and information service

for the insurance industry, targeted at users served by IBM's Information Network service.

Inalink provides communications between insurance companies and agents as well as messaging and information retrieval capabilities. The service automatically reformats policy data transmissions originating in the Agent Company Organization for Research and Development format. Agents using Inalink can transmit one message to a variety of company systems.

The cost of using Inalink is approximately 45 to 55 cents per page. A one-time fee of \$10,000 to \$40,000 is charged for each customer's data translation package.

Western Union, One Lake St., Upper Saddle River, N.J. 07458.

Customer-premise equipment

A modular voice- and call-processing system called Callpress has been announced by Applied Voice Technology, Inc.

Callpress is available in four- and eight-port models. The four-port model accommodates up to 200 users and can store up to 6½ hours of messages. The eight-port model can accommodate 500 users and 13 hours of voice storage. According to the vendor, any combination of voice mail and automated attendant modules is available.

Modules include automated attendant, voice mail, transaction and auditors. Features include automatic call answering and call routing.

Callpress is priced from about \$7,500 to \$14,500.

Applied Voice Technology, 140th Ave. N.E., Bellevue, Wash. 98005.

Links

A gateway software product said to provide IBM mainframe users with access to 10 Western Union Corp. messaging services has been introduced by Wizard Computer Products.

Wizard Link connects IBM mainframes to Western Union's Easylink service. Messaging services available include telex, mailgram messages, cablegrams, computer letters, telegrams, overnight express documents, priority letters and mail to other Easylink mainframes.

Wizard Link runs under CICS. Transmission is through an AT&T 201C or compatible modem running at 2400 bit/sec. The stand-alone system costs \$3,000. As an add-on to Wizard Mail, it costs \$1,900.

Wizard Computer Products, P.O. Box 1867, Greenville, S.C. 29602.

Cabling

Trane-M Corp. has introduced the Universal Connector RS-232-RJ12, designed for configuring two or more computers, workstations and peripherals.

The Universal Connector is sold in pairs with a 25-ft plug-in telephone cable. It is said to multiplex eight wires to six wires.

The vendor said each connector has two switches that can be switched between Transmit Data and Receive Data.

A pair, including telephone wire, costs \$24.95.

Trane-M, 28 Blacksmith Drive, Medfield, Mass. 02052.

Each workstation can run a variety of operations—word processing, letters, send messages, do spreadsheet planning and more.



A Tandy 2000 computer with hard disk acts as the file server, providing simultaneous access to Tandy 2000, 1000 and other PC compatibles functioning as workstations.

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INSIDE

Mind Sets

Commercial, customizable expert systems are increasingly finding their way onto the factory floor. Page S3.

Recipe for Success

Following a set of tried and true guidelines can help a company sidestep the common pitfalls encountered during MRP II implementation. Page S4.

CIM-plification

By tackling the tough problems up front, you can greatly ease the introduction of CIM into your manufacturing environment. Page S4.

Human Factors

The degree to which a company addresses people issues can mean the difference between success and disaster in the shift to advanced manufacturing technology. Page S7.



Vendor Viewpoint

Pick has all the right attributes for a relational data base management system in an advanced manufacturing operation. The trouble is that no one knows about it. Page S10.

Product Charts

A detailed guide to MRP II software. Page S11.

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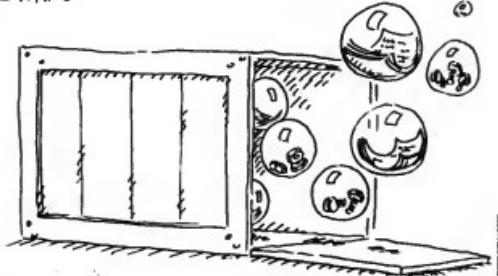
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What makes CIM elusive is that it isn't a product that can be put into a box. Its real core is not equipment but process.

IN PURSUIT OF INTEGRATION

MICKEY WILLIAMSON

Demandst



CHUCK BRADLEY

Stripped of all the fancy talk, computer-integrated manufacturing (CIM) is nothing more than superlative system design. The system, in this case, is an entire manufacturing enterprise: from computer-aided design (CAD) through finished product, from administrative offices to factory floor and even, in the ideal, from a manufacturer's suppliers to its customers.

That may be easy to say, but creating a truly integrated manufacturing system is extremely difficult to do. So difficult, in fact, that no U.S. manufacturer has done it yet. According to Julie Priggy, editor of the "CIM Strategies" newsletter, "You can't find a single company anywhere that has what people think of as a comprehensive CIM operation." The technology exists, but, experts say, a massive change in attitude will have to occur before truly integrated factories develop in this part of the world.

The term "computer-integrated manufacturing" suggests various things to various people. Just as CIM in this country is unlikely to ever be as all-inclusive as it is in Japan, where some manufacturers are linked to their suppliers and customers in a single system, the concept takes on different shapes when viewed in light of individual company situations.

To some, CIM is a way of linking already-autonomized pieces of factory equipment; to others, it means connecting the shop floor with corporate financial management systems. CIM can also mean coupling design engineers' stations with flexible manufacturing systems or hooking into a supplier's order-entry system as part of a just-in-time inventory management program or being part of a customer's just-in-time scheme on the other end of the production cycle.

It is a mistake, however, to think of CIM as just a set of technologies. "One of the shortcomings of CIM as a buzzword is that it sounds like

something you can go out and buy," Priggy says. Actually, the components of a fully integrated manufacturing system are too numerous and too varied to ever be supplied by a single vendor, and organizations intending to embark on a CIM program must be prepared to do some of their own integration and customization to get the system to work. And, at its heart, CIM is not machinery but an expression of a corporate philosophy and strategy.

Charles Savage, a Wellesley, Mass.-based manufacturing automation consultant and principal at D. Appleton Co., distinguishes between two levels of CIM, which he designates "CIM I" and "CIM II." CIM I, he says, is actually computer-interfaced manufacturing. It concentrates on building physical connections among the various functional departments in an organization so that they can pass files back and forth among themselves. Taken only to this level, CIM can create more problems than it solves.

Each department, Savage explains, has its own way of looking at the world and its own language. "Words that have one meaning in one [departmental] context often mean something different in another," he says. Without interfaces between departments, people make translations as a matter of course. "If you bypass the people and try to send digital information directly from one department to another," he warns, "chances are you're going to have problems."

In order for the integrated manufacturing concept to work, Savage says, there must also be

Williamson is a technical journalist based in Warwick, Mass. She writes frequently on advanced computing techniques.

Computer-Integrated Manufacturing

A cross-sectional view of enterprise elements



CIM "Wheel" developed by the Technical Council of the Computer and Automated Systems Association of SME (CASA/SME) -- Copyright 1981 CASA/SME Second Edition, Revised November 1, 1985

Integration

FROM PREVIOUS PAGE

"computer-integrative management of the manufacturing enterprise," or what he calls CIM II. "It isn't as though one day you're not integrated and the next day you are," he says. Integration is an ongoing process with management at its core.

Three infrastructures

Savage describes three infrastructures that make up a CIM system: the technological infrastructure that creates the connection among manufacturing units in a manufacturing enterprise; the referential infrastructure in which a data item has the same meaning regardless of the database in which it resides; and an attitudinal infrastructure in which everyone in the organization shares a vision of where the enterprise is headed and how to get there.

It is pointless, for example, to integrate engineering design workstations with equipment on the manufacturing floor if design engineers have no interest in designing for manufacturability and consider the suggestions of manufacturing engineers as the whims of an inferior caste. Savage says the sharp divisions between functioning units in a manufacturing organization and between workers and managers are at the core of America's industrial malaise. "If we built buildings like we define jobs, the ceilings would be four feet high, and people would have to walk around in a stooped mode," he says.

The need for revitalization of the manufacturing sector is a theme repeatedly sounded by

CIM proponents. If the U.S. is to remain competitive in the global marketplace, proponents say, the country must rethink its methods.

Joel Orr of Orr Associates, Inc., in Great Falls, Va., argues the focus on CIM to concern over the "radical erosion" of the U.S. post-World War II position of kingship in the world manufacturing economy. He disputes the common prediction that the U.S. will soon become a service economy. To remain viable, Orr explains, a nation must create wealth, not just move money around as it does when providing services. And the only way to create wealth is through agriculture and manufacturing. "We're not going to become a nation of service industries," he says. "If we go too far along that path, the U.S. as we know it will cease to exist. Somebody will simply walk in and take over."

We need to build more flexibility into our system. When gasoline prices soared in the 1970s, demand intensified for economy automobiles. It took U.S. automakers five years to catch up with the marketplace, largely because of the lack of integration among automotive design, tooling and manufacturing functions. Meanwhile, overseas automakers virtually walked away with the American car market.

We also need to cut costs. "We're in terrible shape if we compare ourselves with the Japanese just in the area of overhead," says George Sibbald, a principal in the consulting firm Genivation, Inc., in South San Francisco, Calif. "We have four times as many middle managers as the Japanese, and we pay them four times as much. That's

a sixteenfold deficit when we go out in the marketplace."

Planning for CIM, Sibbald maintains, often leads to a simplification of the manufacturing process, even if the company never implements its integration plan. In fact, he says, the need for automation itself, as well as the need for integration, often decreases when an organization takes a good hard look at the way it does things and decides to streamline and simplify its operations.

In a forthcoming book, *Organismic Management*, Orr describes the engineering and manufacturing departments in a typical organization as "a pair of pyramids that meet only at the level of the organization's president. There is a gap between them from the ground up to the top." Orr, also coauthor of *The CIM Handbook* (McGraw-Hill Book Co., 1987), says there would be no such gap in a fully integrated company. "There would be a single structure. Whether it would be pyramidical is another question entirely. I'm not certain that the pyramidical structure is well suited for the implementation of CIM," he says.

Building bridges

In most American organizations, cultural change will be a necessary part of integrating the manufacturing enterprise. So, too, will be building bridges between all of the activities that combine to form the business. In his book, *Complexity & Systematic Organization* (Cutter Information Services, 1986), Lee Haze, manager of the Systemex industrial consulting division of Cooters & Lybrand, identifies five major stages of manufacturing operations and 15 functions within them that would be linked in an internally integrated manufacturing system:

- Engineering:
 - Design,
 - Analysis,
 - Documentation,
- Planning:
 - Parts planning,
 - Production and inventory planning,
 - Control.
- Process, shop and materials control.
- Inspection, testing and quality.
- Production:
 - Parts and tool production,
 - Assembly,
 - Handling and storage.
- Support:
 - Facilities engineering and maintenance,
 - Personnel management,
 - Data processing,
 - Order processing,
 - Accounting,
 - Associated with these func-

tions are the hardware and software that must be linked to form an integrated whole: microframes, minicomputers and micro-programmable controllers, static test equipment, robots, data collection equipment such as bar code and laser beam readers, applications for manufacturing resource planning, simulation, quality assurance,

etc. department. "What you want to do," he says, "is create one view of the product and the process and then use that view at each succeeding stage of the operation."

One means for doing this is being pioneered by the aerospace industry in a project called Product Data Exchange Specification (PDES), funded by the U.S. Air Force.

PDES is a standard way of describing parts and processes used in a variety of industrial organizations.

This kind of standardization facilitates dialogue among functional units within a company. It also eases communications between organizations, allowing a company to place orders with its suppliers and fill orders from its customers by communicating digitally rather than through hard-copy purchase orders.

PDES, Savage says, provides "a common reference model so that when companies cut the part, service the part or price the part, they'll all be talking about the same thing."

Driven by the desire for accurate digital communications, the most forward-looking companies are beginning to treat data as a corporate asset — to the extent of creating a data administrator's position, whose job it is to create standard definitions for items of data, regardless of the

WHAT YOU want to do is create one view of the product and process and then use that view at each stage of the operation."

CHARLES SAVAGE
D. APPLETON CO.

control of individual manufacturing tools and processes, administrative applications such as accounting and human resource management, decision support and data base management software. Add to these the office and factory networks and their associated servers and software, and you have the daunting picture that so often keeps companies from tackling a CIM planning project.

And building bridges is not enough. If the information that is coming across those bridges is not in a language that all parts of the system can understand, confusion is often the result.

Savage tells of one company that has seven different ways to list the same parts, each way determined by the needs of a differ-

CASA/SME awards

1986

Martin Marietta Energy Systems, Inc.

Y-12 Plant

Oak Ridge, Tenn.

The Y-12 Plant was created by the Computer and Automated Systems Association of the Society of Manufacturing Engineers (CASA/SME) as an example of a comprehensive computer-integrated manufacturing (CIM) program that reflected top-level strategic planning and grass-roots implementation. Starting in 1978 with a commissioned study of the still-nascent computer-aided design and manufacturing technologies, the Y-12 Plant moved forward to implement a state-of-the-art CIM installation.

1985

Cone Drive Operations of Ex-Cell-O Corp.

Traverse City, Mich.

Labor and material costs, a high inventory investment and foreign competition com-

peted Cone Drive to adopt CIM, according to CASA/SME, and the results were, and continue to be, impressive. Among the benefits attributed to CIM technology and practices are reduced manufacturing costs, improved quality and increased efficiency in both manufacturing throughput and integrity of deliveries.

1984

General Electric Co. Steam Turbine-Generator Operations Schenectady, N.Y.

General Electric's CIM system in Schenectady was, according to CASA/SME, formulated in recognition of a changing marketplace. In essence, the company devised a master plan that would link the total operation — from price quotation through engineering and manufacturing and all the way to finance — in a common, integrated data base.

location or architecture of the data base in which they reside. "I know we've made it when finance puts an asset number on a datum the same way it puts one on a table or a computer," Savage says.

Control over the corporate data dictionary, Savage adds, is "a new and burgeoning field," which he refers to as computer-aided data engineering, or CADE. "It's going to emerge in the 1990s," he predicts, "and that's when we're going to hit some pay dirt. It will make true integration possible."

Less paper, less cost

Other pieces of the CIM puzzle are starting to fall into place. One is group technology, a method of coding engineering drawings according to parts families so that the drawings can be re-tried when another engineer

IF YOU focus on body count or insist that every project in the plan show a 22% internal rate of return, you're not going to get CIM."

LEE HALES
SYSTECON

is to design a similar part.

Today, most engineering drawings are handled as though they were done in a paper-based system. So, instead of looking through a library of sheets when a new one is needed, the engineer is likely to find it easier to start from scratch. The results, in addition to time wasted in redesign, include large inventories of similar parts that must be kept in stock for repairs, confusing and inaccurate parts lists and erroneous documentation — much of which could be avoided if an engineer were freed from the need to reinvent the wheel on each assignment.

Getting CAD-generated engineering drawings to communicate with other parts of the manufacturing system is another tricky hurdle. Just finding the starting point in a drawing can be difficult, especially for a machine shop that serves a number of customers.

An attempt to iron out the problems with this interface is being made in another Air Force-funded project being developed by LTV Corp. in Dallas and McDonnell Douglas Aerospace in St. Louis. McDonnell Douglas is a prime contractor to the Air Force in building B-1 bombers. LTV is a subcontractor. To date, LTV has succeeded in sending the design for a B-1 part created on its Automation Technology Products Complex CAD system directly to McDonnell Douglas' computer-aided design and

drafting system. There, the drawing is used to write a program for a numerical controller, which then produces and inspects the part.

All of this is performed digitally — a significant change from the more familiar practice of producing the design on a blueprint at McDonnell Douglas and then having people at LTV interpret the blueprint, write the numerical controller program, punch the program tape and proofread the program.

The next part of the program, which will cost hundreds of thousands of dollars, calls for the two companies to reverse the process, with McDonnell Douglas sending the design to LTV and LTV using the digital data to produce the part.

According to Don Norwood, CIM programs manager at LTV, the companies anticipate a 90% reduction in design-to-production time. "The real payoff is that this can all be done and tested on a computer screen without ever making a part," Norwood says.

Justifying the costs

In this way, piece by piece, forward-looking companies are moving to eliminate the remaining obstacles to fully integrated manufacturing systems. But the process will always be a slow one, according to Systemcon's Hales. "To achieve significant levels of integration is typically a four- to five-year program," he says. That is one reason, he says, that management must pay close attention to rigorous cost justification.

"To sell it to the board of directors," Hales says, "you have to focus on what's going to do for you in the marketplace. Will it increase sales or retain parts you might otherwise lose? Does it improve cost structure so that you can increase margins when parts are flat?"

Management, he continues, must take a long-term view of competitive position. "If you focus on body count or insist that every project in the plan show a 22% internal rate of return, you're not going to get CIM. Not all projects show those kinds of tangible returns. You have to be thinking strategically. You don't really know what return you've achieved until you have the integration in place and operating."

But Hales says he has no doubt the benefits exist. "We're not talking about 10% improvements," he says. "In some cases, we're talking about tenfold improvements in things like cycle time, time to market or time to implement introduction of a design change. Those results are real."

CIM at DEC

Digital Equipment Corp. is a vendor of CIM building blocks that practices what it preaches.

Continued on page 35

Artificial intelligence takes a stand on the factory floor

Artificial intelligence on the factory floor is usually equated with robotics, but that concept is much more limited than reality.

The fact is there are more commercial applications of AI technology in manufacturing than in any other field, including finance. Most recently, vision systems have been incorporated into the inspection process. And voice technology, sometimes coupled with natural language processing systems, is now being employed for hands-free tasks such as physical inventory.

Until recently, the most advanced of these systems have been developed in-house and were proprietary. Companies that made the large investment necessary to develop them did so either to fix problems they would prefer the public knew nothing about or to give themselves a competitive edge that might evaporate if the competition knew the tools existed. Consequently, specifics about these advanced systems were usually embargoed.

But now a growing number of knowledge-based, or expert, systems are coming into public view as some companies lift the veil off their proprietary technology and as custom-made commercial systems begin to hit the market.

The best known in-house expert system is Digital Equipment Corp.'s configuration expert, called R-1 during development at Carnegie-Mellon University and renamed Xeon when DEC assumed responsibility for its continued development. Working from customer orders, Xeon develops the configuration specifications for about 90% of all VAX computer systems that DEC ships and is reported to be saving the company some \$1.8 million each year by reducing the number of components manufactured unnecessarily.

When AI can do for you

Other companies are putting expert systems to work in scheduling, troubleshooting, decision support and quality inspection as well. Some of these tasks, of course, are already being handled by traditional applications built on a data base, so it is logical to ask why adding AI technology makes the jobs any better than using what exists now.

One answer is that expert systems technology was developed to tackle problems in which some information may be incorrect or entirely missing — just the kind of situation that brings algorithmic programs to their

knives. Another is that expert systems can take a great many factors into account in reaching a conclusion; human experts typically can handle only three or four considerations at a time. In addition, expert systems can do things that human beings cannot do — or can do only with great difficulty and expense.

For example, one company has a system that compares X rays of a machined part with computer-aided design drawings and locate internal manufacturing flaws. When a defect is located, the system directs a precisely aimed laser blast into the part to prevent the flaw from migrating and then adds data about the problem and the remedy to the quality assurance report it leaves with the part through the production process.

Ford Motor Co. has a system, built by Precept Automation, Inc. in Pittsburgh, that monitors

another generic expert system called DSSCA Manufacturing System by Pittsburgh-based Decision Support Systems for Commercial Applications. The product analyzes production schedules to optimize the allocation of resources and looks for opportunities to salvage materials in the rework pile for use in filling incoming customer orders.

A typical process factory has between 5% and 10% of its inventory on the rework pile at any time. It often costs less to discard spoiled materials than to spend time performing the complex calculations that would uncover other uses for them. For a company that counts on a 10% return on investment and must scrap 10% of its raw materials, turning half of the rework pile into salable finished goods can have a dramatic effect on profits.

MSA Advanced Manufactur-

ing, a division of Management Science America, Inc. in Atlanta, sells an expert system that acts as a front-end enhancement to its MRP II software. Inserting company-specific information into MSA's MRP II software, the expert system streamlines the coding process and produces an MRP II system customized for its owner.

A growing number of companies use expert system software, often called shells, to build their own knowledge-based systems, either using in-house programming expertise or outside knowledge engineering expertise. Dozens of shells run on everything from the largest mainframes to personal computers. IBM, DEC and Culinsoft Software, Inc. offer such products; so, too, do many software publishers and consulting companies.

Lee Hales, director of Computer and Lyndhard's Systech consulting division, says that the use of AI technology should at least be considered by anyone planning for computer-integrated manufacturing (CIM). "It's not axiomatic that every CIM plan needs an expert system," he says, "but somebody should look at it, evaluate tools and understand what other companies have achieved."

The question of whether AI technology can work in manufacturing is no longer an issue, Carnegie Group's Fox says. "We're past the point of proving the technology," he adds. "We're now at the point of finding whether people are smart enough to get involved with it."

MICKEY WILLIAMSON

A little preparation takes risk out of MRP II

BY LARRY G. CURRY

If you surveyed the top managers of U.S. manufacturing companies today, most would probably voice some, if not all, of the following complaints:

- We can sell, but we can't ship.
- We've got cash-flow problems.
- We're getting a lot of calls from irate customers.
- We've got too much inventory.
- People don't properly execute top management's plans.
- We're not as competitive as we used to be.
- We're losing market share.

These are the mistakes manufacturers gripe about, but are they really the problems, or are they only the symptoms of a company lacking the control of an overall game plan? Probably the latter.

Most companies do not have a strategy that encourages all of their employees to march to the beat of the same drummer. As a result, they are seldom able to produce the right quantity of the right product at the right time.

Manufacturing resource planning (MRP II) has long been recognized as the tool that allows a company to generate the integrated company plan required to improve top management's control of the business.

Misconceptions

Why, then, have so few companies chosen to take advantage of it? Possibly it is because of the misconception that MRP II is just another computer system or that it addresses only inventory issues. Or perhaps management is looking for a quick fix for all of their problems.

MRP II is none of the above. It is a people system that integrates the plans of marketing, finance, engineering and manufacturing into a unified company strategy. It is not a quick fix; the average implementation time lasts from 18 to 24 months. During that time, the implementation project must be given highest priority, second only to the product's shipment.

Fortunately, MRP II pioneers have helped chart a path to successful MRP II implementation. Following this path can help a company avoid the pitfalls most commonly encountered during implementation.

First step: education

Curry is an American Production and Inventory Control Society-certified practitioner with 19 years of experience in manufacturing. He was involved with MRP II implementations at two Oregon companies and has been with The Oliver Wight Companies, an education and consulting firm, since 1984.

with any project, the first step — education — is one of the most critical. This includes off-site classes for the chief executive officer, his executive staff and the middle-management team. The purpose of this is twofold: It allows management to make an intelligent decision regarding the need for MRP II, and, by visibly involving upper management, it stresses the importance the company places on the undertaking. This second objective cannot be emphasized

MRP II sales forecast

Worldwide sales potential for U.S. companies, 1987 to 1990



enough. The attitude of the people responsible for making MRP II work is a key element in a successful implementation.

The project team. Once the decision has been made to proceed, a project team must be selected. This team should be composed primarily of users and include a full-time project leader. The leader should be selected from inside the company, should be knowledgeable about the company's processes and products and have credibility with both top management and users. His No. 1 priority must be to provide direction to the project team and ensure that the project is always moving forward.

The executive steering committee, which is made up of the CEO and his staff, must review the project's progress to ensure that it stays on track.

Software selection. One of the most common mistakes made by companies that are implementing MRP II for the first time lies in the area of software selection. In his book, *The Right Choice — A Complete Guide To Evaluating, Selecting and Installing MRP II Software* (Oliver Wight Limited Publications, Inc., 1987), Christopher Gray says, "Never make a software decision until initial education is complete."

Members of the management team must understand MRP II

and decide how they want the company to operate. They can then select the software package that best supports their needs. To make an uninformed software decision can severely limit a company's future options.

Preparing for the pilot. Concurrent with initial education and software selection, top management must begin production planning and establish written master production scheduling policies. In addition, steps must be taken to ensure data accuracy in the bill of materials and inventory records. The software must also be tested, and a pilot project selected. Once all of these pieces are in place, the pilot project can begin.

There are three possible approaches to converting to MRP II: parallel, cold turkey and the live pilot. The parallel approach has two major drawbacks. First, it requires a substantial drain on resources to operate both systems, and, second, it implies that the new output will be compared with the old to verify its validity. Since, in most cases, MRP II is being implemented because the output of the old system was inaccurate or inadequate, comparison of the two is probably not a valuable undertaking.

Tom Wallace, author of the book *MRP II: Making It Happen — The Implementer's Guide to Success in Manufacturing Resource Planning* (Oliver Wight Limited Publications, Inc., 1985) says that "you better go cold turkey." You can't "cram" it. It is similar to stepping off a cliff: Once you take the first step it's almost impossible to change your mind, and if the fall doesn't kill you, the sudden stop will. One high-tech company on the West Coast combined limited education with the cold turkey approach and stopped all output from the production areas for three days.

The recommended approach is the live pilot. This method provides maximum control with minimum risk. The pilot should be allowed to run until everyone involved is assured that the output is correct and is familiar with its operation.

As soon as the pilot is complete, conversion of the remaining products should begin. Products should be converted one or two at a time to maximize control and minimize risk. When all is operating smoothly, a similar approach should be used to bring the execution and financial systems on line.

MRP II allows people to do their job better. It can work only if everyone involved is properly educated. Fifteen years ago, only about 20% of companies implementing MRP II were successful in their endeavor. Today, any company that approaches the process carefully and with skilled guidance should reap the full benefits of MRP II within two years. *

Avoiding obstacles on the road to CIM

BY DAVID SHINKFIELD

As with all business changes, computer-integrated manufacturing (CIM) begins to pay for itself only when it is successfully implemented. There is some evidence, however, that a number of major companies that were early starters have been bogged down or have run into obstacles on the road to CIM.

All this means is that CIM implementation is complex and that achieving the planned benefits is a major challenge, not that CIM is unrealistic or unachievable. There are ways to minimize the potential problems inherent in automating and integrating the manufacturing process.

First and foremost, it is crucial to keep your objective in sight: the creation or improve-

COMPLEXITY poses the biggest threat. The simpler the application can be kept, the greater the probability of success.

ment of your company's competitive advantage. Specifically, this means improving customer service, quality, response time and value for money. While developing and implementing your CIM facility, all decisions should be measured against this objective.

Another priority is to develop a comprehensive strategy that will provide a focus for the many different disciplines — facility planners, product designers, sales engineers, customer service engineers, manufacturing engineers, system designers and human resource managers — that will be involved in making the integrated facility work.

In order for goals to be achieved, the new technologies must be matched to changes in management and the way the manufacturing process is organized. Management structure, roles, responsibilities, perhaps even attitudes, must be changed if the new information technology is not going to merely reinforce old and perhaps irrelevant management practices.

Complexity poses the biggest threat to a company introducing CIM. The simpler the application can be kept, the greater the probability of success. If possi-

ble, therefore, it is best to streamline the process and the flow of materials before designing the CIM system. The reward for this exercise is that your objectives may be met with less automation but more management and control.

Practice vs. perception

Hewlett-Packard Co. advises companies that wish to get into CIM to learn how their factories actually function as opposed to how they are supposed to function. One project in which our firm, PA Technology, was recently involved confirmed the wisdom of that advice. During the development of a new integrated facility at a Fortune 100 company that supplies the automotive industry, we noted a major difference between actual practice and management perceptions of practice in the area of chemical measurement methods. Convincing management that its assumptions regarding the operation of its factory were incorrect required a significant effort.

Costing out CIM can be complicated by accounting practices reflecting the traditional belief that hardware, not software, represents the major capital investment. A CIM introduction has a significant software component that can, in some instances, account for up to a third of the project costs. These costs must be an integral part of the budgeting and funding authorization process.

In simpler times, when equipment purchases were largely stand-alone machines, it was plant equipment that was purchased first, and software followed. A CIM installation consists of a variety of equipment, which can be supplied by a range of vendors. This equipment must be interconnected.

To minimize the complexity, again, it is best to start by preparing a system interface specification, defining how equipment will talk to the network and then including that standard in the equipment purchase order.

Where CIM has failed, the company has usually been in too much of a hurry to open the doors to the new technology. An incremental approach to achieving the strategy reduces the risks and any potential pitfalls.

Finally, the latest thinking on managing complex projects suggests attacking high-risk areas first. If you can crack the biggest problems up front, by comparison the rest will seem easy. *

Shinkfield is director of advanced manufacturing at PA Technology in Hillsborough, N.J.

Integration

FROM PAGE S3

"CIM is critical for our long-term success," says Richard Haslett, DEC's manufacturing CIM program manager. "It's a competitive issue for us."

Haslett says that DEC's manufacturing arm has used computers to manage the business almost since its inception, so the company followed "the classical CIM growth path by developing ever larger islands of automation," he says. Now the company has several major programs to bridge those islands and to reach out to the rest of the world.

One program focuses on shop floor integration; another links engineering to manufacturing; and a third is working on electronic data interchange with

CIM is critical for our long-term success. It's a competitive issue for us."

RICHARD HASLETT
DIGITAL EQUIPMENT CORP.

DEC's suppliers.

"The engineering-to-manufacturing interface work is really on the cutting edge for our particular industry," Haslett says. "The quicker we can get products to market, the more competitive we're going to be."

The electronic data interchange program, which Haslett says is "still embryonic in terms of our relationships with specific vendors," has a just-in-time inventory management system as its goal. DEC has been working on just-in-time techniques long enough to be seeing measurable results. The company routinely plots financial data for five vendors that it considers to be major competitors. One of the factors measured is inventory turn (cost of goods sold divided by average inventory), a measure of the nonproductive portion of corporate assets.

"DEC had always defined the bottom end of the range," Haslett says. "But five years ago, we set out to improve our materials management performance." At the end of fiscal 1986, DEC led the group in inventory performance and expects to do so again this year.

"The first half of the journey, getting up to the average, just involved taking out a lot of the inefficiencies that had crept in, but surpassing the top end of the scale was the result of a very focused effort. Now we're setting the parameter for the top end, and it's still climbing," Haslett says.

To take those results to the bottom line, if nothing had

changed, the company would have needed more than \$2 billion in inventory to support its level of business in 1986. Instead, "we closed the books at about \$1.4 billion, so we added \$600 million to \$700 million to the balance sheet," Haslett notes. "That number really catches their attention."

Longtime icons

The role model for this kind of success is still few and far between, so few, in fact, that most industry experts name the same companies. First on almost everyone's list is Deere & Co. (formerly John Deere), maker of farm equipment. Deere's Winterowd, Tractor Works was the first recipient of the Industry LEAD award given annually since 1981 by the Computer and Automated Systems Association of the Society of Manufacturing Engineers for "leadership and excellence in the application and development of computer-integrated manufacturing."

"A lot of people say Deere is losing money," says David Pennington, head of the CIM unit at Detaquest, Inc., a San Jose, California-based market research firm. "But the point is, they're in a market where everyone else has gone broke. The fact that they're still around is due to their willingness to invest and be pioneers."

A number of factors keep companies from implementing a CIM strategy. Pennington lists 10 and says, "Put them all together, and it's like hitting a brick wall." Among these impediments are the following:

- Lack of a manufacturing strategy. A sense of direction is crucial to a CIM plan, yet many organizations are unable to articulate where they are going or how they intend to get there.
- Inappropriate product design. "You can't just take a product and say, 'OK, now we'll produce this by automation,'" Pennington says. "You have to design it to be produced by automated equipment."
- Lack of standards, especially for communication. "IBM doesn't talk to DEC doesn't talk to HP doesn't talk to Tektronix and so forth. It's a mess," Pennington says.

"We're beginning now to get some standards," he says. The manufacturing automation protocol protocol spearheaded by General Motors Corp. is one notable effort.

- Technically weak top management. Management today tends to come from administrative departments such as accounting or marketing, with no experience in the technology of manufacturing or design, Pennington says, and is therefore unable to cope with the complexities of CIM.

• Inappropriate measures being used for return on investment. "The assumption

Continued on page S6

VENDOR VIEWPOINT

Pick Systems: A step beyond the obvious

BY JOHN BLUMBERG



It has long been a given that manufacturing systems require a data base system at their heart. This became increasingly true as the drive toward computer-integrated manufacturing (CIM) accelerated.

Today, the relational model is being espoused by most manufacturers and software developers. There also seems to be a general agreement in the manufacturing community that, while it does not solve all of a manufacturer's integration problems, the relational model does offer the best opportunity of achieving CIM.

What is unfortunate is that one of the most effective realizations of this model is one that is little known or recognized. Ask any MIS manager or consultant where to go for a relational data base system, and his answer will be IBM, Cullinet Software Inc., Oracle Corp., Software AG of North America, Inc., Applied Data Research, Inc. and Cincom Systems, Inc.

Or, if the manager has a particu-

lar hardware bias, the response will probably divided among IBM, Hewlett-Packard Co., Digital Equipment Corp., Wang Laboratories, Inc. or an-

other vendor. Pick's relational data base predates the published works of Edward Codd and Chris Date, pioneers in the field of the relational model.

Available from the start

Consultants and analysts point out three major advantages in the relational model: easy user interaction, programmer productivity and flexibility. These were the driving forces behind the development of pre-cursors to the Pick system at TRW, Inc. in 1965.

While a certain number of organizational, managerial and planning prob-

lems have to be expected in any data base implementation, the Pick system reduces them to a minimum. Pick can be used in a business environment without the high-priced MIS talent that is normally associated with a data base system. There are more than 60,000 Pick systems installed worldwide, and most of them are run without the benefit of an MIS department.

An employee with minimal training can input and extract the information he needs from the system. Pick allows a user to direct the machine to deliver infor-

mation with English-like commands. The operator asks the computer to LIST or SORT information from a relational table, states the desired selection conditions and lists the data by the desired name. These commands can be predefined, and the user can receive on-screen prompts for selection criteria.

Pick's data fields are defined in data dictionaries and given meaningful business names. The data base supports calculated fields, virtual fields, copied fields, numbers, dates, time of day, characters, text and edited fields. The user does not care about description details — all he needs to know are the data names.

Programming is accomplished through an extended version of Basic. Extensions include string manipulation, structured programming syntax, screen manipulation, subroutine support and output formatting. Programmers working with Pick Ba-

sic report it is more like Pascal than Basic.

The great strength of Pick lies in that it is tightly coupled with the relational data base. A robust array of I/O verbs are provided to efficiently manipulate the data structures. The terminal commands can be used within the programs, providing a built-in report generator capability.

Flexibility is both the hallmark and key attraction of the relational DBMSs, and Pick is extremely flexible. Pick data structures can be changed even when populated with information. When the U.S. Postal Service came up with Zip Plus Four, for example, data bases across the country shuddered, but not Pick. A data dictionary change from five to nine digits was all that was needed.

THERE are more than 60,000 Pick systems installed worldwide, most of which run without the benefit of an MIS department.

Data items such as date and time are not always handled well by data bases, yet these types of data are critical to a manufacturing data base. Pick, on the other hand, has always addressed these data items as special types by offering the user the functionality of a data dictionary to control data entry, display and manipulation.

Adding new data fields, new relational tables and new applications is easy with the Pick DBMS. The data dictionary is active, and there is no data base generation or binding process. Applications, fields and tables can be added to a running system without disturbing the production cycle. Of course, recompilation of programs and data entry are necessary to use the new information.

An unchanging nature

Performance becomes an especially critical issue when the data base adheres to the relational model.

The relational model does not define an implementation, and most relational DBMSs are layered on existing general-purpose file structures, which means little or no optimization can take place. This condition is caused by independent software suppliers implementing their DBMS on someone else's hardware design. With some exceptions, users of those products have no portability and, in some cases, are without upgrade paths.

Pick implementations follow generic specifications, however, so users on any machine view the system as Pick-based. Each of these Pick implementations is

Continued on page S10

Integration

FROM PAGE 55

that if we do nothing, it costs nothing is the worst mistake," Penning warns.

- Rapid changes in technology and the let's-wait-for-the-next-breakthrough syndrome.

Organizations that overcome these difficulties can choose from a number of entries with which to integrate their operations. Some start with a computer-aided design and manufacturing system, some with a manufacturing resource planning (MRP II) system and some by linking existing islands of automation on the factory floor. Few believe that they have the option of taking what industry observers call

SOME START WITH a computer-aided design and manufacturing system, some with a manufacturing resource planning system and some by linking existing islands of automation on the factory floor.

"the green-field approach" of building a fully automated company from the ground up.

Which approach makes most sense is usually a function of the kind of manufacturing enterprise in question and the systems the organization has in place.

Orr stresses the need to start with as few assumptions as possible. "Everybody is saying that the green-field theory of

CIM is too expensive, and the current thought about how to deal with islands of automation is that you build bridges. But it may be better to drain the ocean and get to work with bulldozers — in a sense to start over with existing resources, reallocating and being willing not to have any sacred cows," he says.

Turf warfare is almost inevitable, and a strong management commitment is re-

quired to keep internal politics from driving the CIM plan.

Systemon's Hales describes a typical situation: "Let's say a company's real problem in terms of shipment cycle is that it has a hopeless order entry system in the customer service department. They could take days out of the cycle by cleaning up the front-end paperwork processes in order entry."

"Meanwhile," he continues, "the materials manager is operating a 10-year-old homegrown MRP system that's dated and expensive to maintain. The CIM plan may acknowledge that the MRP system should be replaced, but the order entry system is far more important, so the company will work on that for 24 to 36 months and get to MRP later. That's a pretty tough pill to swallow if you're the materials manager."

In many companies, Hales says, "the person who is the most eloquent and has the ear of the funding executive is going to get the nod. In a CIM plan, each functional manager will have realized his place in the scheme of things, and you'll actually be funding, each year, that year's chunk of a long-term strategic program. That's quite different from the way we go about it today."

Contrary to the predictions of those in information resource management, CIM system design is not likely to fall under the control of the information systems department, according to Hales. "DP professionals tell us they don't want to drive it," he says. "That it should be driven by folks from manufacturing or marketing or top management directly."

However, he adds, the MIS department's contributions are vital to the success of the effort. If it will have developed between manufacturing and MIS, Hales warns, "that has got to be stopped up front. We've got to get back to playing together as a team."

Details and direction

Politics aside, the major pitfall in implementing a CIM plan seems to be a tendency to get involved in the details of architecture before the overall strategic direction has been set. "People cover the walls of the conference room with flow diagrams, and yet they still don't have a vision of what they want to integrate," Hales says.

After a period of lethargy, a growing interest in CIM is starting to reflect itself in the marketplace. Dataquest's Penning says the U.S. market for CIM products has been flat at \$17 billion for the past couple of years. He expects it to reach \$28 billion by 1991, still only about 3.6% of overall capital expenditures in manufacturing.

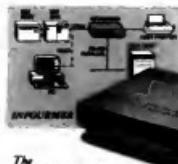
Penning says the new interest in CIM stems from a recognition that manufacturers "must use computers and new organizational strategies." That message has gotten through, he says. "The questions now are how and what is the best way."

Deciding to integrate may be a "bet your business" decision, Penning says, but "deciding not to is to bet on going out of business."

"There's an opportunity here as well as a threat," he continues. "How else are we going to create the wealth to give us the standard of living that we've become accustomed to? What else are we going to do: sell each other insurance and sue each other? Where's the wealth? It's got to come from agriculture and manufacturing," he says.

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Human systems demand equal time in CIM effort

BY STEPHEN STULCK

The transition to a computer-integrated manufacturing (CIM) environment poses challenges to virtually all elements of traditional organizational life. Implementing CIM calls for deliberate and planned change that recognizes the way the three major subsystems of a product-producing organization — the manufacturing system, the information system and the human system — overlap and interact.

It is in the intersection of these three domains that change is most pronounced. Most organizations are able to address each area independently but struggle when it comes to addressing them in an integrated manner.

Many organizations, although receptive to innovation in technology, resist innovation in the social or organizational domain. Compounding that irony is the fact that most of the recalibrators are aware, at least on an intellectual level, that when technically innovative projects fail, it is generally not because of technical problems but because people issues go unaddressed.

A critical first step in managing the changes that accompany the introduction of advanced manufacturing technology is to identify those human issues, many of which involve more than manufacturing and require attention from the entire corporate management.

Structural changes

When a manufacturing organization moves ahead into an advanced automation mode, functional groups within the production facility tend to report directly to the plant manager, since the need for rapid detection and correction of errors mandates a short line of communication.

Reducing the managerial hierarchy in this way encourages managers to assume increased responsibility and adopt a more participative management style. Often, no more than three or four levels of management exist within a plant from the shop floor to the plant manager. The employees who feel the greatest impact from this hierarchical change are the lower- and mid-level managers, who are

asked to assume a much broader span of control.

Reducing the managerial hierarchy also results in a dramatic reduction of job classifications. With fewer classifications, jobs become less defined, and employees must develop defined skills that cross traditional functional or operational boundaries. A single job might, for instance, include aspects of production, materials, maintenance, quality control, personnel and housekeeping.

This blurring of functional responsibilities is not limited to the shop floor. Management and technical support staff must also cope with a greater degree of ambiguity. For example, the distinctions between quality-assurance engineering and process engineering or between product and manufacturing engineering is increasingly difficult to describe.

As a result, there is a trend in advanced manufacturing envi-

ronments toward the development of work teams having the skill and authority to identify and fix problems they experience in the production process. Since it is difficult for one person to understand the entire operation, the use of a team allows information to be pooled.

Compensation systems often need to be modified to reflect and support changes in the organizational structure. Most notably, pay-for-learning systems are being developed to foster individual commitment to learning and to encourage employees to take on broad responsibilities for the operation and maintenance of the plant. These plans reward individuals with money, based on demonstrated competence in a wider range of skills and tasks. Group compensation programs reward employees at the corporate, plant or group level for improved performance.

Political changes

Power and conflict, as central features of organizational life, are affected deeply, if not always openly, by the introduction of CIM.

Shifts in the distribution of power within a plant from the shop floor to the plant manager. The employees who feel the greatest impact from this hierarchical change are the lower- and mid-level managers, who are

affected deeply, if not always openly, by the introduction of CIM. Shifts in the distribution of power within the organization

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Plant managers, while given greater autonomy within the plant, are more dependent on product design groups, equipment engineering and marketing and must therefore learn to in-

teract with them in a collaborative manner.

At the same time, the supervisor is asked to become an effective boundary manager and coach, ensuring that a work group has the information, skills and resources it needs to solve problems effectively.

Human resource changes

People need to be committed to organizational goals instead of feeling compelled merely to comply with specified behaviors. A paradox of CIM is that while a company's automation increases, its manufacturing process becomes increasingly de-

pendent, which has tremendous implications for the organization's relationship to its human resources.

Symbolic changes

The introduction of CIM is not a purely rational act. The organizational environment is ambiguous, contradictory and often confusing to those who work within it. To derive sense and order out of specific events or decisions, we use myths and rituals to help explain them.

Two major symbolic themes that arise in implementing CIM deal with the cultural values that encourage democratic participa-

Key components of CIM

Areas of interaction and maximum change



ILLUSTRATION: PHILIPPE DELILLE/ITP/BATSON

tion and management by practice instead of by procedure.

As previously mentioned, expertise and knowledge become the prime determinants of authority in the organization, and control shifts according to who can contribute to the resolution of a given problem at a given time.

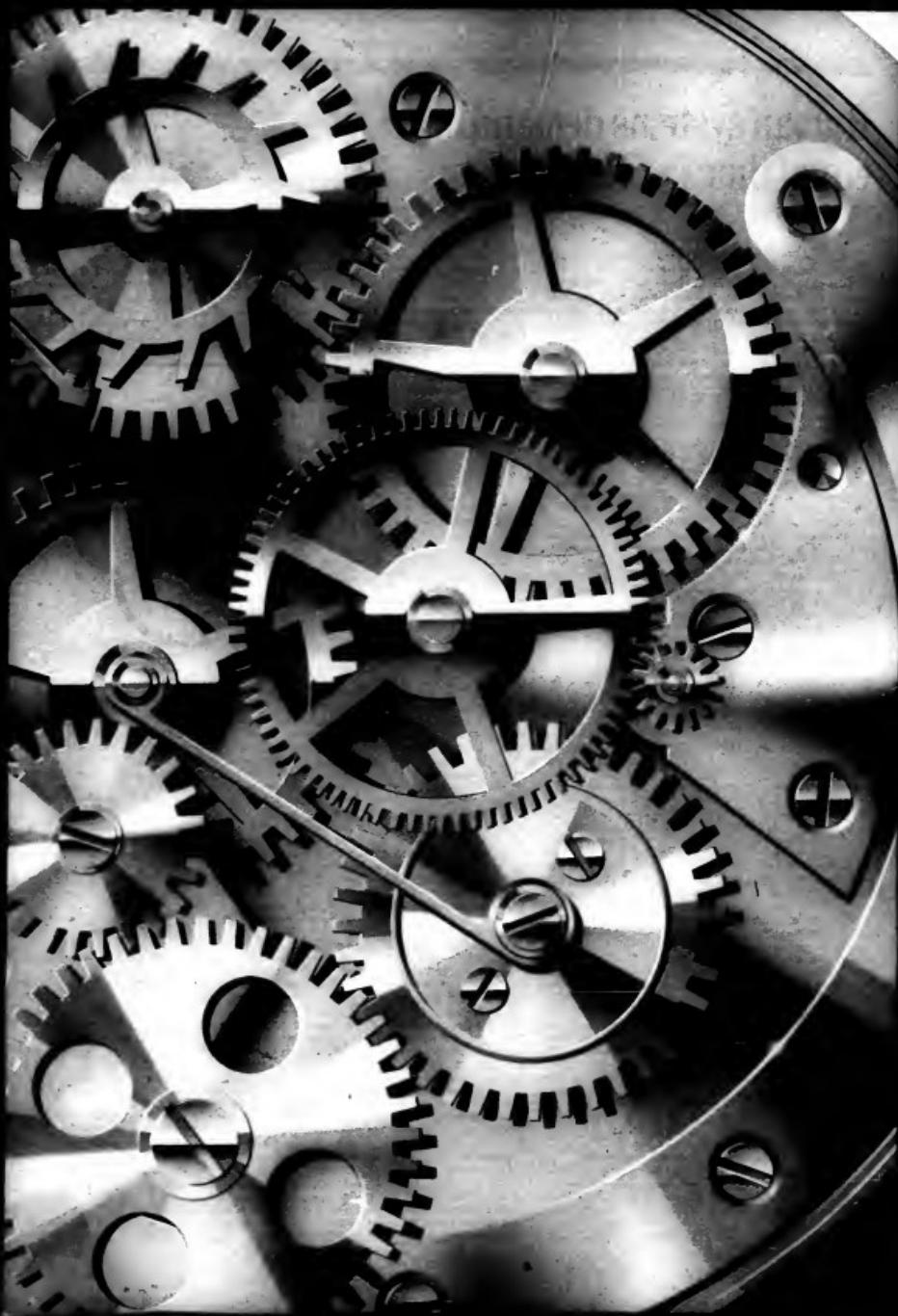
Business objectives are frequently discussed widely and in explicit terms on the assumption that when employees have a central role in creating the organization, they tend to feel more committed to the organization. This theory appears to be valid for the first generation of employees in the plants. Whether it holds true over time is a subject for research.

In a CIM operation, problem solving is a responsibility that belongs to everyone in the plant, and there should be an effort to foster an environment in which information is readily available and in which problems surface early. This is happening in many places, and the term "employee information system" is starting to crop up with some frequency as a replacement for "management information system."

An even more significant redefinition resulting from CIM comes in the accounting status of human resources investments. Instead of regarding labor as a variable cost, companies often begin to treat it as a fixed cost of

the implementation of CIM. The implementation of CIM requires managers to suspend their business-as-usual perspective. Technical innovation and social innovation are inextricably interconnected. Social innovation requires the same degree of attention, knowledge and experimentation as any technical system.

We need to learn how to create organizations capable of using the promise of computer-integrated manufacturing to its best advantage. To do that, we need to have organizations that mirror the characteristics of CIM technology: agility, adaptiveness, robustness and efficiency. *





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Business Computing Systems

Pick Systems

CONTINUED FROM PAGE 55

hardware-dependent and optimized for the specific target machine. There are three methods used to put Pick on a computer: the dedicated approach, coexistence and data base machine.

In the dedicated approach, the machine is engineered to run the Pick operating system as the native control system. Since hardware, firmware, utilities and mass storage are all set up specifically for Pick, performance is optimized.

Using the coexistence approach, Pick is implemented as a data base environment within Unix or Prime Computer, Inc.'s Primos. Performance is maintained

FAULT-TOLERANT nonstop processing is a requirement for many manufacturing environments, and Pick is currently one of the few relational DBMSs that are implemented on redundant hardware systems.

by special CPU firmware and a formatting of mass storage devices to hold data in the Pick format. This technique is used by Prime with Prime's Information data base.

An array of machines — from vendors as diverse as NCR Corp., NEC Corp., Apollo Computer, Inc. and AT&T, to name a few — offer support for both Pick and Unix. Although the two operating environments

might be expected to be fierce competitors, they actually complement each other. Unix is becoming a major factor as an operating system, and Pick adds a relational data base that supports many manufacturing and general business applications.

Fault-tolerant nonstop processing is a requirement for many manufacturing environments, and Pick is currently one of

the few relational DBMSs that are implemented on redundant hardware systems. Nonstop communication front-end processors are available for some minicomputers and mainframe machines that support the well-known relational systems. Sequioa Systems, Inc. has announced fault-tolerant Pick. Parallel Computers, Inc. is expected to announce a related product shortly, and other fault-tolerant vendors are certain to follow with Pick and Unix functionality in the near future.

The data base machine approach is used by Ultimage Corp. to implement Pick on Honeywell Bull, Inc. and DEC machines. The host processor is augmented by special-purpose processors that execute the Pick data base programs. This leaves the host CPU free to run other tasks, such as native-mode programs, and to manage data traffic.

Ultimage also supplies the Pick system for the IBM 370 architecture machines — the 4300 and 9370 processor series — and larger mainframes. In this implementation, Pick runs as a machine under VM, which results in an interesting combination of all three methods.

From the beginning, Pick was to be a small-system solution. The objective was to provide the user community with low-cost, easy-to-use, people-oriented solutions. This meant 8- and 16-bit processors that could support few terminals, limited memories and limited mass storage.

That may have been, but it's not the way it is now. Pick is available on systems that are small in size, but there is no lack of power. Thanks to Motorola, Inc.'s 68000 and Intel Corp.'s 80386 chips, Pick processors are available in small packages that will realistically support more than 1,000 users.

In manufacturing and in CIM, integration is everything. Distributed processing is seen by many in the manufacturing world as a necessary strategy for achieving fully integrated systems. Pick is no stranger to that sphere.

Since early 1985, the Pick system has been available on a wide variety of Intel 8086- and 80286-based desktops from more than 20 vendors. More than 10,000 users adopted Pick on their desktops in 1985 and 1986. This makes the Pick system a viable choice for individual companies that follow the clustered personal computer philosophy of distributed data processing.

For organizations that see the plant-level controller systems approach as the way to implement distributed data processing, Pick systems are also a solution. Prime, for example, supports networked links between desktops executing Pick programs and superminis that act as file servers for the information data base. This approach distributes the computing load to desktops and preserves the integrity of the relational data base.

Desktops running Pick are effective in off-loading host machines in the development process. Programming, system modeling and system testing can take place on PCs, and the finished software can then be moved to the host for production. This conserves valuable ports and machine cycles needed to support the manufacturing business process.

Although few MIS professionals, industry consultants or data base gurus will mention Pick in a relational data base discussion, Pick is a real entity whose existence has been overlooked for much too long. *

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MRP II software

COMPANY	PRODUCT NAME	TARGET MARKET	TOTAL NUMBER OF MODULES	MODULES (MAXIMUM)	HARDWARE REQUIRED	AMOUNT OF TRANSACTIONS UPATED IN REAL-TIME	HOST CHANGE-OR-REGISTRATION LOGIC-BAKED	ONLINE DISTRIBUTION RESOURCE PLANNING	ROUTE PLANNING AND SCHEDULING	INTEGRATED ACCOUNTING(1)	FINANCIAL SYSTEM	APPLICATIONS AND DRILLS	INTERNATIONAL DATA BASE MANAGEMENT	FOURTH-GENERATION DEVELOPMENT TOOLS	MANAGER OF CURRENT U.S. SITE LOCATIONS	PRICE PER MODULE
American Manufacturing Software, Inc. (609) 539-7822	PMC	Assembly and distribution companies with 20 to 150 employees	17	Production engineering, scheduling, manufacturing, subcontracting, capacity planning, quality planning, financial management, accounting	IBM AT, XT and compatibles, PC/T/T 28 series, DEC Tower, Unisys 4000 series, Comshare Major, Prime, DEC PCL/PDS, VME, Comshare, Prime, Sun/386	All	Regeneration	No	No	Yes	Yes	Yes	Yes	Yes	7	\$1,000-\$15,000
American Software, Inc. (316) 245-3380	Marsco	Electronics, car component manufacturers	12	Master scheduling, shop floor control, inventory control, sales order processing, capacity planning, quality planning	Data General MV line	All	Batch	Yes	Yes	Yes	Yes	Yes	Yes	Yes	None	Contact vendor
American Business Computer, Inc. (313) 888-4830	ABC Manufacturing Management	Reactive manufacturers	6	MRP, inventory control, production planning, bill of materials, vendor management, distribution, distribution, distribution, distribution	AT&T Unix System V, Microsoft Xenix, DEC MD-2000	Most	Regeneration	Yes	No	Yes	Yes	Yes	No	No	30	\$2,000-\$20,000
American Software, Inc. (404) 261-4381	MRP-II	IBM mainframe users	11	MRP/MPS, bill of materials, route or work center, production order entry, capacity planning, quality planning, financial management	Any IBM mainframe	Most	Batch	Yes	Yes	Yes	Yes	Yes	No	70	Contact vendor	
Applied Information Development, Inc. (312) 574-3658	AMIS Manufacturing Control System	Medium- to large-size manufacturers and distributors	6	MRP, MPS, CRM, distribution, requirements planning	Any IBM mainframe	Most	Batch	Yes	No	No	No	No	No	10	\$30,000-\$75,000	
Arthur Andersen & Co. (312) 507-0695	Mac-Pro/On-Time	Contract manufacturers	12	Job-to-order planning, Kanban, design engineering, manufacturing engineering, material control, master scheduling	IBM 386, 370, 3800, 3900, 4300 series	All	Batch	No	Yes	No	Yes	Yes	Yes	110	Contact vendor	
Mac-Pac/D	Defense industry	14	Design engineering, inventory control, shop floor control, cost estimating, quality control, material engineering, contract accounting	IBM 386, 370, 3800, 3900, 4300 series	All	Batch	Yes	Yes	No	Yes	Yes	No	25	Contact vendor		
Adv. Computer Systems, Inc. (615) 959-4445	Manus Information System	Manufacturers with \$5 million to \$20 million in sales revenue	19	Manufacturing, order entry, subcontracting, bill of materials, general ledger, fixed assets, accounts payable, quality control	HP 2000 series, DEC VAX	All	Regeneration	No	Yes	Yes	Yes	No	1,000	\$80,000-\$400,000		
Asia Computer Systems, Inc. (917) 481-0490	AsiCOM	Make-to-order companies with \$10 million to \$250 million in sales	19	MRP/MPS, product configuration, bill of materials, subcontracting, customer service, shop floor control/CAP, MRP, bill of materials, requirements planning, manufacturing	Unisys 5050, 5070, 5090	All	Batch	No	Yes	Yes	Yes	Yes	Yes	30	\$44,000 (per 8 users)	
Booking Computer Services (800) 551-0050	Predictive Management System	Avionics, defense manufacturers	14	MRP with master scheduling, sales/order entry, purchase/reorder, bill of materials, general accounting, bill of materials, inventory control	IBM 4380 series and above, SP 2600	All	Batch	No	Yes	Yes	Yes	No	Yes	50	\$80,000-\$100,000 (host system and client)	
Biosoft Systems, Inc. (919) 538-3230	Plant Manager	Small- to medium-size manufacturers	13	MRP with master scheduling, sales/order entry, purchase/reorder, bill of materials, general accounting, bill of materials, inventory control	IBM AT	Most	Regeneration	No	No	Yes	No	No	No	50	Contact vendor	
CBC Computer, Inc. (714) 881-4336	Mac-Part II	Mid-size discrete manufacturers	16	Accounts payable/bank reconciliation, cost estimation, subcontracting, production scheduling, bill of materials, inventory control	Prime 90 series	All	Net change	Yes	Yes	Yes	Yes	Yes	Yes	30	Contact vendor	
Castles Associates, Inc. (800) 415-8888	Management System	Manufacturers with \$5 million + in sales	22	Production planning (MPL), MPS, CRM, bill of materials entry, sales order entry, purchase/reorder, bill of materials, bill of materials with bill of materials, subcontracting, bill of materials, inventory control, shop floor control with automated data collection	Wang V5	All	Batch	Yes	Yes	Yes	Yes	Yes	Yes	90	\$10,000-\$15,000 (host system cost)	
Chase Systems, Inc. (513) 665-3290	Control Manufacturing	Portions 1,000 companies	14	Pad sheet/bill of materials, financial, behavioral traceability, project management, material requirements planning, subcontracting, production scheduling, bill of materials, inventory control	IBM 3860, 3880, 4300 series, 8970, DEC VAX/VMS	All	Net change	Yes	Yes	Yes	Yes	Yes	Yes	100+	\$10,000-\$100,000 (host system cost)	
Comprehensive Corp. (714) 879-0800	Dynamic	Manufacturers with \$2 million to \$50 million + in sales	18	MRP, accounting, distribution, work order processing, capacity planning, subcontracting, production scheduling, bill of materials, inventory control	Data General MV 2600 to 26,000 series, IBM PC AT	Most	Batch	Yes	Yes	Yes	Yes	No	Yes	100	Contact vendor	
Computer Connection (303) 777-6555	Integrated Manufacturing System	Custom-built manufacturers	9	MRP with entry, bill of materials, subcontracting, production planning, and inventory	IBM PC and compatibles on PC-DOS, Novell Netware, DEC VMS, DEC PDP-11, DEC VAX	All	Net change	No	Yes	Yes	No	No	No	100	\$2,000	

(Manufacturing resource planning * Master production scheduling * Capacity requirement planning)

The companies included in this chart responded to a recent telephone survey conducted by Computerworld. Further product information is available from vendors. Research assistance was provided by The Oliver Wight Companies.

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COMPANY	PRODUCT NAME	TARGET MARKET	TOTAL NUMBER OF MODULES	MAIN MODULES (10X MAXIMUM)	HARDWARE REQUIRED	AMOUNT OF TRANSACTIONS UPDATED IN REAL-TIME	NET CHANGE OR REGENERATION/TODAY-BASED	OFFICE DISTRIBUTION	EDUCATIONAL MATERIALS	TOOL PLANNING AND SCHEDULING	SHARED ACCOUNTING/ FINANCIAL SYSTEM	APPLICATIONS AND DATA INTEGRATION	RELATIONAL DATA BASE MANAGEMENT FACILITIES	FOURTH-GENERATION DEVELOPMENT TOOLS	NUMBER OF CURRENTLY LISTED BUSINESS	PRICE PER MODULE
Computer Strategies, Inc. (814) 967-4444	Reactive Manufacturing System	Reactive manufacturers	6	Financial control system, quotation management system, level load planning system, capacity planning system, sales order entry system, demand-driven manufacturing and forecasting system	DEC VAX, Novellus DPS-4, IBM 3270	Most	Net change	Yes	Yes	Yes	Yes	Yes	Yes	No	20	\$20,000-\$200,000
Computer Systems Development, Inc. (817) 450-0330	Impeon	All manufacturers	11	MPS, component data and inventory management, purchasing, materials planning, bill of materials, shop floor control, labor management, manufacturing control, material requirements planning, sales order entry, quality inspection	DEC VAX, DPS-11	Most	Regeneration	Yes	Yes	Yes	Yes	Yes	Yes	Yes	20	\$5,000 (average)
Computer Technology, Inc. (209) 455-1790	MCIS II	Manufacturers with \$3 million + in sales	7	MPS, component data and purchase order processing, bill of materials, shop floor control, labor management, manufacturing control, material requirements planning, sales order entry, quality inspection	Wang VS	All	Both	No	Yes	Yes	Yes	Yes	Yes	Yes	70+	\$2,000-\$7,000
Cullinet Software, Inc. (817) 329-7790	Manufacturing System	Manufacturers, government contracting companies	13	MPPMPS, order entry, scheduling, inventory control, bill of materials, costing	IBM 3270 series, 3200 series, 3290, 3270, 3284, 3290, 3291, 3292, 3293, 3294, 3295, 3296, 3297, 3298, 3299, 3290, 3291, 3292, 3293, 3294, 3295, 3296, 3297, 3298, 3299	Most	Both	Yes	No	Yes	Yes	Yes	Yes	Yes	—	\$70,000 (approximate)
DBMS Information (714) 857-3744	SMC	Manufacturers with \$5 million to \$50 million in sales	11	Purchasing, materials planning, general ledger, order processing, sales order entry, payroll, production control	DEC VAX series, T1 890, AT&T Data System 7	All	Both	No	Yes	Yes	Yes	Yes	No	No	100	Contact vendor
Data Systems for Industry Corp. (213) 692-4641	QED	All manufacturers	16	Inventory control, bill of materials, purchasing, work center, sales order entry, planning, receiving inspection	HP 3000, Series/38	All	Both	No	No	Yes	Yes	No	No	No	50	\$6,000-\$24,000
Data Systems, Inc. (707) 820-0640	Manufacturing Resource Planning Series 38-5	Small manufacturers	12	MPS, MPS, business planning, order entry, inventory control, purchase order management	IBM Systems/36	All	Regeneration	No	No	No	Yes	No	No	No	100	Contact vendor
DBPS 38-5	All manufacturers	13	MPS, MPS, business planning, order entry, purchasing, materials management, payroll	IBM Systems/36	All	Regeneration	No	No	Yes	Yes	Yes	No	No	No	100	Contact vendor
DBPS 38-7	Process manufacturers	12	MPS, MPS, business planning, general ledger, accounts receivable, accounts payable, manufacturing control	IBM Systems/38	All	Regeneration	No	No	Yes	Yes	Yes	No	No	No	100	Contact vendor
Diversified Data Systems, Inc. (602) 793-3380	Semanic-Kreisline	Manufacturers with \$50 million + in sales	16	MPS, inventory control, forecasting, shop floor control, scheduling, vendor analysis, job costing	Wang VS, DEC VAX, Series 3200	All	Both	No	Yes	Optimal	Yes	Yes	Optimal	10	\$2,000-\$30,000	
Dynamic-Sysco Systems, Inc. (301) 641-0600	Star Manufacturing Resource Planning	Manufacturers with less than \$50 million in sales, diverse large companies, FDI-regulated companies	16	MPS, inventory control, lot controllability, bill of materials, customer order entry, scheduling, manufacturing orders, shop floor control	HP 3000 PC and compatibles	All	Both	Yes	Yes	Yes	Yes	Yes	Yes	Yes	70+	\$5,000-\$15,000
Easys, Inc. (204) 628-0905	Manufacturing and Control	General, discrete manufacturers	9	MPS, standard costing, inventory planning, shop floor control, purchase order processing, sales order entry, general ledger	All hardware supporting Pick operating systems, PDP 11, 24, 30, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 59, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392, 394, 396, 398, 400, 402, 404, 406, 408, 410, 412, 414, 416, 418, 420, 422, 424, 426, 428, 430, 432, 434, 436, 438, 440, 442, 444, 446, 448, 450, 452, 454, 456, 458, 460, 462, 464, 466, 468, 470, 472, 474, 476, 478, 480, 482, 484, 486, 488, 490, 492, 494, 496, 498, 500, 502, 504, 506, 508, 510, 512, 514, 516, 518, 520, 522, 524, 526, 528, 530, 532, 534, 536, 538, 540, 542, 544, 546, 548, 550, 552, 554, 556, 558, 560, 562, 564, 566, 568, 570, 572, 574, 576, 578, 580, 582, 584, 586, 588, 590, 592, 594, 596, 598, 600, 602, 604, 606, 608, 610, 612, 614, 616, 618, 620, 622, 624, 626, 628, 630, 632, 634, 636, 638, 640, 642, 644, 646, 648, 650, 652, 654, 656, 658, 660, 662, 664, 666, 668, 670, 672, 674, 676, 678, 680, 682, 684, 686, 688, 690, 692, 694, 696, 698, 700, 702, 704, 706, 708, 710, 712, 714, 716, 718, 720, 722, 724, 726, 728, 730, 732, 734, 736, 738, 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1116, 1118, 1120, 1122, 1124, 1126, 1128, 1130, 1132, 1134, 1136, 1138, 1140, 1142, 1144, 1146, 1148, 1150, 1152, 1154, 1156, 1158, 1160, 1162, 1164, 1166, 1168, 1170, 1172, 1174, 1176, 1178, 1180, 1182, 1184, 1186, 1188, 1190, 1192, 1194, 1196, 1198, 1200, 1202, 1204, 1206, 1208, 1210, 1212, 1214, 1216, 1218, 1220, 1222, 1224, 1226, 1228, 1230, 1232, 1234, 1236, 1238, 1240, 1242, 1244, 1246, 1248, 1250, 1252, 1254, 1256, 1258, 1260, 1262, 1264, 1266, 1268, 1270, 1272, 1274, 1276, 1278, 1280, 1282, 1284, 1286, 1288, 1290, 1292, 1294, 1296, 1298, 1300, 1302, 1304, 1306, 1308, 1310, 1312, 1314, 1316, 1318, 1320, 1322, 1324, 1326, 1328, 1330, 1332, 1334, 1336, 1338, 1340, 1342, 1344, 1346, 1348, 1350, 1352, 1354, 1356, 1358, 1360, 1362, 1364, 1366, 1368, 1370, 1372, 1374, 1376, 1378, 1380, 1382, 1384, 1386, 1388, 1390, 1392, 1394, 1396, 1398, 1400, 1402, 1404, 1406, 1408, 1410, 1412, 1414, 1416, 1418, 1420, 1422, 1424, 1426, 1428, 1430, 1432, 1434, 1436, 1438, 1440, 1442, 1444, 1446, 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2112, 2114, 2116, 2118, 2120, 2122, 2124, 2126, 2128, 2130, 2132, 2134, 2136, 2138, 2140, 2142, 2144, 2146, 2148, 2150, 2152, 2154, 2156, 2158, 2160, 2162, 2164, 2166, 2168, 2170, 2172, 2174, 2176, 2178, 2180, 2182, 2184, 2186, 2188, 2190, 2192, 2194, 2196, 2198, 2200, 2202, 2204, 2206, 2208, 2210, 2212, 2214, 2216, 2218, 2220, 2222, 2224, 2226, 2228, 2230, 2232, 2234, 2236, 2238, 2240, 2242, 2244, 2246, 2248, 2250, 2252, 2254, 2256, 2258, 2260, 2262, 2264, 2266, 2268, 2270, 2272, 2274, 2276, 2278, 2280, 2282, 2284, 2286, 2288, 2290, 2292, 2294, 2296, 2298, 2300, 2302, 2304, 2306, 2308, 2310, 2312, 2314, 2316, 2318, 2320, 2322, 2324, 2326, 2328, 2330, 2332, 2334, 2336, 2338, 2340, 2342, 2344, 2346, 2348, 2350, 2352, 2354, 2356, 2358, 2360, 2362, 2364, 2366, 2368, 2370, 2372, 2374, 2376, 2378, 2380, 2382, 2384, 2386, 2388, 2390, 2392, 2394, 2396, 2398, 2400, 2402, 2404, 2406, 2408, 2410, 2412, 2414, 2416, 2418, 2420, 2422, 2424, 2426, 2428, 2430, 2432, 2434, 2436, 2438, 2440, 2442, 2444, 2446, 2448, 2450, 2452, 2454, 2456, 2458, 2460, 2462, 2464, 2466, 2468, 2470, 2472, 2474, 2476, 2478, 2480, 2482, 2484, 2486, 2488, 2490, 2492, 2494, 2496, 2498, 2500, 2502, 2504, 2506, 2508, 2510, 2512, 2514, 2516, 2518, 2520, 2522, 2524, 2526, 2528, 2530, 2532, 2534, 2536, 2538, 2540, 2542, 2544, 2546, 2548, 2550, 2552, 2554, 2556, 2558, 2560, 2562, 2564, 2566, 2568, 2570, 2572, 2574, 2576, 2578, 2580, 2582, 2584, 2586, 2588, 2590, 2592, 2594, 2596, 2598, 2600, 2602, 2604, 2606, 2608, 2610, 2612, 2614, 2616, 2618, 2620, 2622, 2624, 2626, 2628, 2630, 2632, 2634, 2636, 2638, 2640, 2642, 2644, 2646, 2648, 2650, 2652, 2654, 2656, 2658, 2660, 2662, 2664, 2666, 2668, 2670, 2672, 2674, 2676, 2678, 2680, 2682, 2684, 2686, 2688, 2690, 2692, 2694, 2696, 2698, 2700, 2702, 2704, 2706, 2708, 2710, 2712, 2714, 2716, 2718, 2720, 2722, 2724, 2726, 2728, 2730, 2732, 2734, 2736, 2738, 2740, 2742, 2744, 2746, 2748, 2750, 2752, 2754, 2756, 2758, 2760, 2762, 2764, 2766, 2768, 2770, 2772, 2774, 2776, 2778, 2780, 2782, 2784, 2786, 2788, 2790, 2792, 2794, 2796, 2798, 2800, 2802, 2804, 2806, 2808, 2810, 2812, 2814, 2816, 2818, 2820, 2822, 2824, 2826, 2828, 2830, 2832, 2834, 2836, 2838, 2840, 2842, 2844, 2846, 2848, 2850, 2852, 2854, 2856, 2858, 2860, 2862, 2864, 2866, 2868, 2870, 2872, 2874, 2876, 2878, 2880, 2882, 2884, 2886, 2888, 2890, 2892, 2894, 2896, 2898, 2900, 2902, 2904, 2906, 2908, 2910, 2912, 2914, 2916, 2918, 2920, 2922, 2924, 2926, 2928, 2930, 2932, 2934, 2936, 2938, 2940, 2942, 2944, 2946, 2948, 2950, 2952, 2954, 2956, 2958, 2960, 2962, 2964, 2966, 2968, 2970, 2972, 2974, 2976, 2978, 2980, 2982, 2984, 2986, 2988, 2990, 2992, 2994, 2996, 2998, 3000, 3002, 3004, 3006, 3008, 3010, 3012, 3014, 3016, 3018, 3020, 3022, 3024, 3026, 3028, 3030, 3032, 3034, 3036, 3038, 3040, 3042, 3044, 3046, 3048, 3050, 3052, 3054, 3056, 3058, 3060, 3062, 3064, 3066, 3068, 3070, 3072, 3074, 3076, 3078, 3080, 3082, 3084, 3086, 3088, 3090, 3092, 3094, 3096, 3098, 3100, 3102, 3104, 3106, 3108, 3110, 3112, 3114, 3116, 3118, 3120, 3122, 3124, 3126, 3128, 3130, 3132, 3134, 3136, 3138, 3140, 3142, 3144, 3146, 3148, 3150, 3152, 3154, 3156, 3158, 3160, 3162, 3164, 3166, 3168, 3170, 3172, 3174, 3176, 3178, 3180, 3182, 3184, 3186, 3188, 3190, 3192, 3194, 3196, 3198, 3200, 3202, 3204, 3206, 3208, 3210, 3212, 3214, 3216, 3218, 3220, 3222, 3224, 3226, 3228, 3230, 3232, 3234, 3236, 3238, 3240, 3242, 3244, 3246, 3248, 3250, 3252, 3254, 3256, 3258, 3260, 3262, 3264, 3266, 3268, 3270, 3272, 3274, 3276, 3278, 3280, 3282, 3284, 3286, 3288, 3290, 3292, 3294, 3296, 3298, 3300, 3302, 3304, 3306, 3308, 3310, 3312, 3314, 3316, 3318, 3320, 3322, 3324, 3326, 3328, 3330, 3332, 3334, 3336, 3338, 3340, 3342, 3344, 3346, 3348, 3350, 3352, 3354, 3356, 3358, 3360, 3362, 3364, 3366, 3368, 3370, 3372, 3374, 3376, 3378, 3380, 3382, 3384, 3386, 3388, 3390, 3392, 3394, 3396, 3398, 3400, 3402, 3404, 3406, 3408, 3410, 3412, 3414, 3416, 3											

MANUFACTURING TECHNOLOGY
SPOTLIGHT

COMPANY	PRODUCT NAME	TARGET MARKET	TOTAL NUMBER OF MODULES	MAJOR MODULES (SELL MAINTAIN)	HARDWARE REQUIRED	AMOUNT OF TRANSACTIONS UPATED IN REAL-TIME	NET CHANGE OR REGENERATION LOGIC-BASED	COPYS DISTRIBUTION AND TOOLS PLANNING AND SCHEDULING	INTEGRATED ACCOUNTING / INTEGRATED SYSTEM	APPLICATIONS AND DRILLS	NATIONAL DATA BASE	MATERIAL PLANNING	MANUFACTURING PLANNING	MANUFACTURING EXECUTION	DATA PROCESSING FOR DEVELOPMENT/ODA	NUMBER OF CURRENT U.S. SITE LICENSEES	PRICE PER MODULE
Honeywell Soft., Inc. (800) 865-3771	Manufacturing Systems	Medium to large size manufacturers	8	MPS, MPS, inventory management, manufacturing, data control, job floor control, purchasing, processing	Honeywell DPS, DPS 2, DPS 3, DPS 8	AS	Net change	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	—	\$4,000-\$36,000
	Distributed Manufacturing System	Small to medium-size manufacturers	8	MPS, inventory control, shop floor control, order processing, financial management	Honeywell DPS 4, 5, 6+	AS	Net change	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	—	\$7,000-\$17,000
IBM Contact local IBM office	Manufacturing Accounting and Production Control Systems (MAPCS) I and II	Small to large size manufacturers	10	MPS, inventory management, product data management, MPS, CRM	All IBM Systems/36, 32 modules	AS	Batch	No	No	Yes	Yes	No	Yes	—	Aprox. \$5,500		
	Communications Oriented Production Information Control Systems (COPICS)	All manufacturers	25	MPS, customer order servicing, MPS, CRM, purchasing/receiving, plant monitoring and control	IBM 370, 4300 series, 3090, 3270 series	Most	Batch	No	No	Yes	No	No	Yes	—	Contact vendor		
Intermet Computer Systems, Inc. (800) 874-1500	Pro-MIS	Wholesalers, distributors, manufacturers	9	MPS/MPS, inventory management of materials, capacity planning, shop floor control, costing, labor management	IBM Systems/36, 38	Most	Regeneration	Yes	Yes	Yes	Yes	Yes	Yes	—	Contact vendor		
Infox Systems, Inc. (713) 830-0954	Shop Floor Control Systems	Custom job-shops and manufacturers	15	Estimating/billing, production planning, cost accounting, financial management, inventory control, bill of materials	All Data General hardware, all AT&T hardware, all VME, VMEbus, AT and compatibles	Some	—	Yes	Yes	Yes	Yes	Yes	Yes	250+	Contact vendor		
Infostructure Management, Inc. (819) 858-0646	Job Manufacturing and Accounting Control Systems	Sheet metal fabricators, custom manufacturers	8	Customer order processing, manufacturing, assembly/test of materials, part reporting, job costing, system administration	IBM AT, and Microsoft MS-DOS compatible systems, VME	AS	Net change	Yes	Yes	Yes	Yes	No	4	\$4,000-\$16,000 based systems cost			
Integral Computer Systems, Inc. (203) 928-0451	Computer Integrated Manufacturing Resource Planner	Manufacturers with \$1 million to \$50 million in sales	20	Purchasing, job shop scheduling, bill of materials, costing, order entry, inventory management	IBM PC-based and LANs, Compaq 386, IBM Systems/36	AS	Net change	No	Yes	Yes	Yes	Yes	Yes	5	\$1,000-\$3,000		
Interactive, Inc. (819) 850-6528	Manufactures Inside	General manufacturers	15	MPS, MPS, capacity planning, production costing, bill of materials management, financial accounting	All Ultima, DEC VAX, MicroVAX, all Prime hardware, IBM 3270, 3280, 3290, 3270, 3280	Most	Batch	No	No	Yes	Yes	Yes	Yes	1,000	\$4,000 (average)		
Interactive Applications, Inc. (406) 727-8191	Manufacturing Core System	Small to medium-size manufacturers	9	MPS, bill of materials, inventory control, purchasing, shop floor control, cost accounting	Up to 4 series, 32, 560 squarefeet	AS	Regeneration	No	No	Yes	No	Yes	0	\$15,000 (total system cost)			
Interactive Information Systems, Inc. (800) 799-4314	IMCS	Manufacturers with up to \$50 million in sales	8	Master scheduling/HPS, order processing, bill of materials, shop floor control	DEC VAX 8800, 3200, IBM 3270, 4200 series, Systech 386, 387, IBM PC, IBM PS/2 series	Most	Batch	Yes	Yes	Yes	Yes	Yes	Yes	100	From \$5,000		
Introlab, Inc. (313) 521-4629, (313) 557-7130 (ex. Michigan)	Manufacturing MIS	All manufacturers	7	Materials control, order management, production, accounting, financial ledger, payroll	IBM Systems/36, 38, IBM PC, IBM 3270 series	AS	Batch	No	Yes	Yes	Yes	No	43	\$2,520-\$11,000			
Jacobson and Associates, Inc. (819) 575-7504	Jacobson	Small to medium-size manufacturers	25	MPS, bill of materials, routing, shop floor control, shop loading, financial management	Data General MV series	AS	Regeneration	Yes	Yes	Yes	Yes	Yes	Yes	62	\$2,000-\$20,000		
Leybold Information Systems, Inc. (800) 723-0700	Interpal XOMS	Manufacturers with \$10 million to \$150 million in sales	19	MPS, MPS, customer order processing, product data management, services, quality management, general ledger	All Prime hardware	Most	Batch	No	Yes	Yes	Yes	Yes	Yes	150	\$5,000-\$9,000		
Leland, Inc. (800) 998-3860	Leland MIS	Manufacturers with \$50 million + in sales	5	MPS, customer order servicing, purchasing, requirements, receiving	IBM 4380, 3280, 3270 series	AS	Batch	No	No	Yes	No	No	—	\$20,000			
MAI Basic Four, Inc. (714) 731-8100	Machine Manufacturing Systems	Discrete, process manufacturers with \$25 million to \$100 million in sales	15	Prospecting and sales management, financial management, production, manufacturing, materials and capacity planning, bill of materials, shop floor control, inventory and purchasing	All MAI Basic Four hardware	Most	Batch	Yes	Yes	Yes	Yes	Yes	Yes	400	\$4,000 (average)		
	Manufacturing Systems	Value-added distributors, make-to-order, make-to-stock, job shop manufacturers with \$1 million to \$20 million in sales	12	Order generation, inventory management, purchase order processing, engineering control, manufacturing control, manufacturing planning	All MAI Basic Four hardware	Most	Batch	Yes	No	Yes	Yes	Yes	Yes	1,000	\$4,000 (average)		
Sure Products Systems	Apparel/Leatherware, Furniture, Home Furnishing, Textiles, Plastics, leather/manufacturers with \$5 million to \$100 million in sales	12	Allocating/parts generation, payroll, payroll, time keeping, sales order processing, cut and sold reporting, fabric and trim requirements	All MAI Basic Four hardware	Most	Regeneration	No	NA	Yes	Yes	Yes	Yes	300	\$3,700 (average)			
MCRA, Inc. (813) 343-0600	MCRA Manufacturing Systems	Discrete manufacturers with \$3 million to \$100 million in sales	19	MPS, inventory control, shop floor control, costing, financials, distribution	Wang VS, DEC PDP 11, all DEC VAX, all Alpha, all 3090 (as needed)	Some	Regeneration	No	No	Yes	Yes	No	No	500	\$2,000-\$5,000		

MANUFACTURING TECHNOLOGY

SPOTLIGHT

COMPANY	PRODUCT NAME	TARGET MARKET	TOTAL NUMBER OF MODULES	MAJOR MODULES (SIC MAINTAIN)	SOFTWARE REQUIRED	AMOUNT OF TRANSACTIONS UPDATED PER HOUR	NET CHANGE OR REINTEGRATION (LONG-HAUL)	CROSS DISTRIBUTION	TOOL PLANNING AND SCHEDULING	INTEGRATED ACCOUNTING/ FINANCIAL REPORTING	INFORMATION IN CAD/DBMS	RELATIONAL DATA BASE MANAGEMENT FEATURES	FOURTH-GENERATION DEVELOPMENT TOOLS	NUMBER OF CURRENT U.S. SITE LICENSEES	PRICE PER MODULE
MC Software, Inc. (800) 824-8953; (617) 525-8104 (in Mass.)	Imman II	Discrete assembly manufacturers, job shops, distributors	11	MRP, inventory, order entry, purchasing, bill of materials, job cost/bill of process	Microsoft MS-DOS 3.0 or higher, CP/M 80, Digital Equipment Corp. Control Data, Novell Networks	All	Regeneration	No	No	Yes	Yes	No	No	—	\$895-\$1,200
MDG Quest, Inc. (412) 887-7777	QMSP	Discrete manufacturers with \$3 million to \$75 million in sales	17	Complete material management, sales order processing, vendor/ customer inventories, capacity scheduling and planning, shop floor control, procurement, complete purchasing applications, complete financials	All General macros, and superuser computers	Most	Batch	Yes	Yes	Yes	Yes	No	Yes	500+	\$1,250- \$10,000
MMS International (812) 896-0728	MCS-3	Repetitive manufacturers	8	MRP, inventory control, of material, scheduling, engineering, capacity planning, vendor/ customer inventories, capacity scheduling and planning, shop floor control, procurement, complete purchasing applications, complete financials	Any hardware supporting Unix, Microsoft Xbase, MS-DOS	All	Batch	No	Yes	Yes	No	No	No	300	\$995-\$1,500
	Systech	Job shops, discrete and make-to-order manufacturers	9	MRP, job shop, purchasing, order entry, inventory control, general ledger	Any hardware supporting Unix, Microsoft Xbase, MS-DOS	All	Batch	No	Yes	Yes	Yes	Yes	Yes	110	\$795- \$16,995
MNM, Inc. (414) 793-0400	Pico-3B	All manufacturers	12	Master scheduling/MRP, engineering data base, capacity planning, shop floor control, standard cost/job cost, order entry	Wang VS series	All	Batch	Yes	Yes	Yes	Yes	Yes	Yes	250	\$2,000- \$32,000
	Pico-3B	All manufacturers	12	Master scheduling, engineering data base, capacity planning, shop floor control, standard cost/job cost, order entry	IBM System/38	Most	Batch	No	Yes	Yes	No	No	No	125+	\$2,000- \$10,000
	Pico-VS	All manufacturers	12	Master scheduling/MRP, engineering data base, capacity planning, shop floor control, standard cost/job cost, order entry	Wang VS series	All	Batch	Yes	Yes	Yes	Yes	Yes	Yes	200+	\$2,000- \$32,000
Modic Corp. (406) 888-4311	Modic	General manufacturers with \$300+ million in sales	21	Procurement, engineering, finance and accounting, marketing and sales, business research	Prime 50 series microsupercomputers, any hardware supporting system	All	Regeneration	No	No	Yes	Yes	Yes	Yes	118	\$31,000- \$225,000 (total system cost)
Management Science Associates, Inc. (494) 229-2000	Am寮/4	Discrete, repetitive, process manufacturers	14	MRP, inventory control, product costing, manufacturing control, sales, marketing, purchasing	IBM 3200 series, 3030, 3090, 3095, 3096, 3098, 3099 IBM plug-compatible	Most	Batch	Yes	No	Yes	Yes	Yes	Yes	225	\$290,000- \$560,000 (total system cost)
	Am寮/Q	Process, repetitive, discrete manufacturers	19	MRP, material control, lot trace, scheduling, managed production, multi-level management, cost management	IBM 3200 series, 3030, 3090, 3095, 3096, 3098, 3099 IBM plug-compatible	Most	Batch	Yes	Yes	No	Yes	Yes	Yes	475	\$290,000- \$560,000 (total system cost)
	Am寮/C	Make-to-order, contract manufacturers, service and design contractors	10	MRP, contract engineering, material control, bill of material, procurement and routing, purchasing control	IBM 3200 series, 3030, 3090, 3095, 3096, 3098, 3099 IBM plug-compatible	Most	Batch	No	Yes	No	Yes	Yes	Yes	15	\$340,000- \$460,000 (total system cost)
	Am寮/2000	Repetitive and discrete manufacturers	16	MRP, material control, cost management, scheduled managed production, lot trace, multi-level management	1970-2000 Series 60, 66, 70, 827, Spectrum 930, 950	Most	Batch	No	Yes	Yes	Yes	Yes	Yes	125	\$134,000- \$240,000 (total system cost)
	Am寮/36/38	Process, repetitive and discrete manufacturers	9	MRP, engineering management, product data management, sales order processing, cash management/financing	IBM System/26, 38	All	Batch	Yes	No	Yes	Yes	Yes	No	50	\$210,000- \$310,000 (total system cost)
Manufacturing Systems Support Services, Inc. (414) 796-1172	MDSS	Selective repetitive manufacturers	15	Estimating and quoting, shop floor control, material control, sales, marketing, purchasing, marketing management	IBM 3200 series	All	Batch	No	No	Yes	Yes	Yes	Yes	—	\$36,000- \$48,000 (total system cost)
Mandate Systems, Inc. (313) 733-4030	ManVista 3900	Repetitive process manufacturers and service applications	17	MRP, MPS, order entry/configuration, quotation multi-level, product costing	IBM 3200, 3270 series, DEC VAX, Honeywell 3000 series, Osborne portables	All	Batch	Yes	Yes	Yes	Yes	Yes	Yes	300+	\$2,000- \$6,000
Manufacturing Solutions International, (414) 448-5310	Manufacturing Control System	Manufacturers with up to \$10 million in sales	11	MRP/MDP, CP/M, engineering data base, standard product configuration, sales, purchase, purchasing, routing	IBM System/34, 36, <td>Most</td> <td>Regeneration</td> <td>No</td> <td>No</td> <td>Yes</td> <td>No</td> <td>No</td> <td>No</td> <td>45</td> <td>\$13,000- \$35,000</td>	Most	Regeneration	No	No	Yes	No	No	No	45	\$13,000- \$35,000
Marvin Data Systems (617) 448-5310	Primo	Process and/or repetitive manufacturers	4	Foundation, resource management, resource procurement, planning	IBM System/38	All	NA	Yes	Yes	Yes	Yes	Yes	NA	22	\$20,000- \$25,000
Marts, Inc. (800) 325-8885	Advanced Integrated Manufacturing System	Small- to medium- size manufacturers	30	MRP, production scheduling, shop floor control, order entry/configuration, custom report generator	All IBM PC/3200, Microsoft MS-DOS, Xbase systems, Apple II	Some	Regeneration	No	Yes	Yes	Yes	Yes	Yes	80	\$2,000- \$3,000
Martin Marietta Data Systems (800) 654-3835	MAS Manufacturing	All manufacturers	14	Manufacturing planning control systems, financial management systems, sales order management	IBM 3200, 3270, <td>Most</td> <td>Batch</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>700</td> <td>Contact vendor</td>	Most	Batch	Yes	Yes	Yes	Yes	Yes	Yes	700	Contact vendor
McCormack & Dodge Corp., Inc. (617) 542-4401; (617) 655-6306 (in Mass.)	Protection and Intelligent Operational System	Discrete and process manufacturers	9	Inventory/MRP, MPS, bill of materials, shop floor control, purchasing, cost management	IBM 3200, 3270, <td>All</td> <td>Batch</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>30</td> <td>\$30,000- \$70,000</td>	All	Batch	Yes	Yes	Yes	Yes	Yes	Yes	30	\$30,000- \$70,000
	CPROS	Aerospace and defense contractors	9	Inventory/MRP, MPS, bill of materials, shop floor control, purchasing, cost management	IBM 3200, 3270, <td>All</td> <td>Batch</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>30</td> <td>\$40,000- \$130,000</td>	All	Batch	Yes	Yes	Yes	Yes	Yes	Yes	30	\$40,000- \$130,000
Micro-MRP, Inc. (800) 525-8777 (in Calif.)	Max, The Protection Manager	Manufacturers with up to \$25 million in sales	17	MRP, MPS, bill of materials, inventory control, master scheduling, purchasing, shop floor control	IBM PC and compatibles, Windows DOS	Most	Batch	Yes	Yes	Yes	Yes	Yes	Yes	350	\$2,000- \$4,000

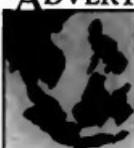
MANUFACTURING TECHNOLOGY

SPOTLIGHT

COMPANY	PRODUCT NAME	TARGET MARKET	TOTAL NUMBER OF MODULES	NUMBER OF MODULES (MAXIMUM)	HARDWARE INCLUDED	NUMBER OF TRANSACTIONS UPATED IN REAL TIME	NET CHANGE-ON-EXCHANGE LOGIC-BASED	OFFICE DISTRIBUTION	TOOL PLANNING AND SCHEDULING	INTEGRATED ACCOUNTING/ FINANCIAL SYSTEM	APPLICATIONS AND DATA INTEGRATION	RELATIONAL DATA BASE	MANUFACTURING PLANNING	POINT-OF-INFORMATION SYSTEMS	GRAPHICAL DESIGN TOOLS	NUMBER OF CURRENT U.S. SITE LICENSEES	PRICE PER MODULE
Micro Software, Inc. (415) 989-0525	Micro Information System	Manufacturers with up to \$500 million in sales	9	MRP, order management, materials management, procurement, general ledger, report writer	IBM 3080, DEC VAX, AT&T 3B, 3L, 3B+, 3B2, 3B3, 3B4, 3B5, 3B6, IBM AT, AT/7575	All	Regeneration	No	No	Yes	Yes	Yes	Yes	Yes	50	\$25,000 (total system cost)	
Mitrel, Inc. (817) 933-9545	Mitrel MFG	All manufacturers	18	Materials management, shop floor control, sales order entry, master scheduling, service and defense, management summary, reporting and control	IBM 3080, 4300 and 4370, PC AT/7575	All	Net change	No	Yes	Yes	Yes	Yes	Yes	Yes	45	Contact vendor	
RCA Corp. (404) 996-1800	Merlin	Manufacturers with \$3 million + in sales, Fortune 500 companies	32	Manufacturing, financial, financial specifications, manufacturing applications, repetitive manufacturing configuration	All DEC VAX systems	All	Regeneration	No	No	Yes	Yes	Yes	Yes	Yes	500	\$15,000-\$16,000	
Norwegian Software Ltd. (419) 631-0611	MIF II	Manufacturers with \$3 million + in sales	8	MRP, process, manufacturing, financial, financial specifications, manufacturing applications, repetitive manufacturing configuration	All IBM computers	Most	Batch	Yes	No	No	Yes	Yes	No	—	845,000-\$846,000		
Northwest Data Systems, Inc. (817) 273-3620	Intelligent Manufacturing Management System	Manufacturers with \$3 million to \$100 million in sales	18	Quotations, marketing, inventory management, production, cost, financials	All Prime computers, DEC 3000, 4000, 5000, 6000 series, DEC VAX	All	Batch	Yes	Yes	Yes	Yes	Yes	Yes	65 to 70	\$15,000-\$15,000		
On-Line Software Lab., Inc. (714) 680-0502	Manufacturing, Accounting, Costing, Scheduling	All manufacturers	18	MRP, MRP, order entry, shop floor control, financials, purchasing	Uses A series	All	Batch	Yes	Yes	Yes	Yes	Yes	Yes	50	\$45,000 (total system cost)		
Oriole Software, Inc. (301) 533-0511	Reaped	Discrete, repetitive/batch-in-TIME, jobbing, government defense contractors	13	MRP, factory management, shop floor control, product structure, time and attendance, automation	All Thinner hardware	All	Net change	No	No	Yes	Yes	Yes	No	0	\$25,000-\$45,000		
Panospheric Systems, Inc. Applications Products Company (312) 254-3600	Manufacturing/DB	All manufacturers	27	MRP, DRP, MPS, CRM, product structure, product standard costing	IBM Systems/24	Most	Regeneration	Yes	Yes	Yes	Yes	Yes	No	500	Contact vendor		
Pactech Systems, Inc. (414) 773-0000	Manufacturing Software	Manufacturers with \$2 million to \$50 million in sales	6	MRP, manufacturing control, manufacturing costing, engineering control, inventory management, quality management, control	IBM 3080, HCR Tower, Unisys 5800	Most	Batch	Yes	Yes	Yes	Yes	Yes	No	500	\$8,000-\$10,000		
Pacific Control International, Inc. (416) 475-1101	Control	Process, pharmaceutical, food, electronic, medical manufacturers	17	MRP, MRP, capacity planning, cost accounting, finance	IBM Systems/24	All	Batch	No	Yes	Yes	Yes	Yes	Yes	1	\$4,000-\$12,000		
Precision Key International, Inc. (800) 898-9900	Manufacturing System	Small-to-medium-size manufacturers	13	MRP, shop floor control, purchasing, financials, engineering, customer management	IBM 380, HCR Tower, AT&T, PC/XT, 3B, 3B2, 3B3, Unisys PC-IT 5800 hardware, various software packages	All	Regeneration	No	Yes	Yes	Yes	Yes	No	—	\$15,000-\$16,000 (total system cost)		
Pro-Max, Inc. (304) 451-0404	Pro-Max	Small-to-medium-size manufacturers	18	MRP, sales order processing, purchase order control, shop floor control, integrated financials	IBM 380 or 386, IBM 3080, 3070 series	All	Batch	Yes	Yes	Yes	Yes	Yes	Yes	230	\$5,000 (total system cost)		
STAC, Inc. (301) 864-8498	Logistics Plus System	Repetitive and process manufacturers	10	MRP, CRM, forecasting, distribution resource planning, master scheduling, bill of material, engineering, quality management	IBM 4300, 3800, 3080, 3070 series	All	Batch	Yes	No	No	No	No	No	2	\$15,000-\$15,000 (total system cost)		
Sage Computing Ltd. (416) 836-5323	Sage S2000	Make-to-stock manufacturers with \$15 million to \$40 million in sales	5	MRP, bill of materials, costing, work-in-progress, capacity planning	Any system supporting Unix, DEC VAX, VCO mainframe	Most	Regeneration	No	Yes	Yes	Yes	Yes	No	10	\$10,000 (average)		
Satcom, Inc. (301) 473-8986	Quality and Manufacturing System	Process manufacturers	9	Quality and specifications, materials management, production management, engineering control, bill of material, engineering, quality management	IBM 3080	Most	Net change	Yes	No	Yes	Yes	Yes	No	21	\$25,000-\$30,000		
Stabberg Research, Inc. (313) 671-4377	Accountant PRO	All manufacturers	4	MRP, inventory, bill of material, costing, quality management	IBM PC, XT, AT and compatibles	Most	Regeneration	No	No	Yes	Yes	Yes	No	75	\$400		
Systems for Profit, Inc. (414) 237-7500	CMI Profit	All manufacturers	9	Accounting, manufacturing planning, manufacturing control, engineering control, quality management, engineering costing	Using 3080 series, HCR Tower, all PC/XT, 3B, 3B2, 3B3, Unisys PC-IT, Syntex 30, PC	All	Batch	Yes	Yes	Yes	Yes	Yes	No	1,100+	Contact vendor		
Systems Software Associates, Inc. (312) 641-3900	SPCS	Manufacturers with \$5 million to \$200 million in sales	23	MRP, MPS, capacity planning, inventory management, shop floor control, Just-in-Time	IBM Systems/24, 38	All	Batch	Yes	No	Yes	Yes	Yes	Yes	400+	\$10,000 (for System/24), \$2,000-\$5,000 (for Systems/38)		
TMC Computer Systems, Inc. (817) 984-3800	Advanced Manufacturing and Financial Systems	Discrete and process manufacturers	12	MRP/MPS, inventory control, bill of materials, purchasing, production control, sales order entry, engineering control, engineering costing	DEC VAX	All	Batch	No	Part-of	Yes	Yes	Yes	Yes	—	\$12,000-\$15,000		
Talos Corp. (312) 971-6111	TIMES	All manufacturers	24	MRP, MPS, shop floor control, manufacturing control, general ledger	Prime 50 series supercomputers	All	Batch	Yes	Yes	Yes	Yes	Yes	Yes	5	\$20,000-\$40,000 (total system cost)		
Thomson Logics & Associates, Inc. (414) 795-0500	ML-50	All manufacturers	13	MRP, engineering records, inventory, purchasing, manufacturing order control, shop floor control	IBM 4300 series or higher	All	Batch	No	Yes	Yes	Yes	Yes	No	25	Contact vendor		

COMPANY	PRODUCT NAME	TARGET MARKET	TOTAL NUMBER OF MODULES	MAIN MODULES (SIX MAXIMUM)	WAREHOUSE REQUIRED	AMOUNT OF TRANSACTIONS UPLOADED IN REAL-TIME	NET CHARGE OR REINTEGRATION LOGIC-BASED	OFFICE AUTOMATION	DATA BASE MANAGEMENT FEATURES	FOURTH-GENERATION DEVELOPMENT TOOLS	NUMBER OF CURRENT U.S. SITE LICENSEES	PRICE PER MODULE
The Digital Computer Co., Inc. (312) 979-1998	Spire II	Manufacturers with 50 million to \$400 million in sales	15	MRP, shop floor control, job costing, quality control, production management, bill of materials	DEC PDP series, VME, AT&T 3B	All	Representation	No	No	Yes	150	\$1,500-\$7,000
Unimicro Corp. (609) 424-2893	Prax	General manufacturers and distributors	18	MRP, master scheduling, capacity planning, order entry/processing, sales/lead tracking, inventory control	DEC VAX	All	Representation	Yes	Yes	Yes	150	\$8,000-\$10,000
Universal International, Inc. (619) 445-0008	Power Control	Wholesale distributors, batch assembly	14	Master scheduling, order entry/processing, vendor order processing, general ledger, production control, sales analysis	DEC VAX	Most	Representation	No	Yes	Yes	12	From \$6,000
Vertical Business Software, Inc. (914) 633-5305	Manufacture with Process Control	Small to medium-size manufacturers	9	Lot scheduling, general ledger, payroll, material management, process control	IBM PC and compatibles, Novell Networks	All	Risk	Yes	Yes	Yes	30 to 40	\$2,000-\$2,500
Xerox Corp. (609) 222-3790	Xerox Business Application Systems	Discrete manufacturers	17	MRP, MRP repetitive processing, general ledger, material management, general ledger, production control	IBM 4380 series, 3280, 3480, 3570	All	Net change	Yes	Yes	Yes	600	From \$225,000
Lewis A. Wright & Associates, Inc. (313) 658-7766	Automated Manufacturing Planning System	Highly repetitive manufacturers	10	MRP, resource scheduling, general ledger, material management, receivable, accounts payable, payroll	IBM Systems/36	Most	Net change	Yes	Yes	—	50	\$1,500-\$21,000
	Actions	Job shop contract manufacturers	10	Job costing/estimating, order entry/processing, receiving, warranty, purchase, general ledger, accounts receivable/payable	IBM Systems/36	All	Representation	Yes	Yes	—	20	\$3,000-\$15,000

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By LISA J. KARAS

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named, made his first
public disclosure of the third
generation of the three
that we have a
MicroStation and the only
one that can do up to 30 million
operations per second. It could
be used for all kinds
of applications, such as
engineering, scientific calcu-
lations, graphics, and
communications.

IBM, including its main power-
ful computer over, has the
highest performance and density by
anywhere else for currently
available products, said by
3090 manager.

The 3090 series features
performance improvements of
up to 15% compared with the
current 3090 line. It also fea-
tures increased expanded stor-
age and in some cases, doubled

The company also intro-
duced enhancements for its VM sys-
tem, which runs on its mainframe
systems, and a new version of its
language, MVS/VM. A new
version of the XA bus, which
is used for connecting worksta-
tions to mainframes, was also

introduced. IBM also
announced a new version
of its LAN, which is used
for connecting worksta-
tions to mainframes. The
new version of the LAN, which
is called LAN II, has a higher
data transfer rate than the
original LAN.

IBM high end

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of dollars

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for

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3090

line

and

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HARD TALK



James Connolly

Godzilla gets serious

The symbolism has been used before. It pops up when IBM gets serious about a field in which dozens of smaller companies are running about with their own profitable, 10% market shares.

"Bambi meets Godzilla" rings crunchingly true again, just as it did a few years ago when it was used to illustrate IBM's impact on victims such as the then-blossoming microcomputer vendors.

This time, Godzilla's shadow is falling on the ASCII terminal makers, whose competition for market share has — compared with what is to come — been about as violent as yearlings going through their first rutting. There was plenty of head-butting but minimal damage. Those vendors would undercut each other by a few bucks — OK, a few dollars — and would claim to be a bit better than the big guys. But the big guys were companies such as Wyse Technology, which is roughly 200 times smaller than IBM.

Then IBM included in its re-

Continued on page 51

DEC minisuper foray looms

Predicted late '88 entrance would speed shakeout in \$300M market

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — Vendors in the minicomputer market are preparing for an invasion by Digital Equipment Corp. in late 1988 that may accelerate the shakeout under way in this market, according to speakers at a recent conference on advanced computer systems.

The market now includes such firms as Alliant Computer Systems Corp., Convex Computer Corp., Scientific Computer Systems Corp., and Floating Point Systems Inc.

The firms typically sell systems in the performance range of 6 million to 40 million floating-point operations per second — a \$300 million market niche just below that of Cray Research.

Inc.'s supercomputers.

The future of this young market was of keen interest at the second annual Conference on Advanced Computer Systems, held here last week by Technologic Partners and Kidder Peabody & Co.

Predicted DEC's entrance

Vendors and analysts predicted that DEC will enter the market in the next 15 to 24 months with vector extensions to the high end of its VAX architecture.

Robert J. Palick, president and chief executive officer of Convex in Richardson, Texas, said DEC users have told his company that the DEC product, called Pegasus, will be a four-head parallel processing machine and run at 15 million instructions per second.

Jeffrey Canin, senior technology analyst for Hambrecht & Quist, Inc., an investment banking firm in San Francisco, said the minicomputer niche is now saturated with suppliers and that the DEC entry will hasten the shakeout, leaving only two or three major survivors. He said it is not clear who the victims will be.

Already, Canin said, two firms have been forced out of the minicomputer market, and Beaverton, Ore.-based Floating Point Systems is retrenching with layoffs and a corporate reorganization. [CW, June 8].

"More institutional investors will buy into two or three of the companies — and quickly flee from whichever gives the first hint of faltering," said Richard A. *Continued on page 50*

Memorex deals IBM add-in card

BY STANLEY GIBSON
CW STAFF

MILPITAS, Calif. — Marking its re-entry into the memory board market, Memorex Corp. recently announced add-in memory cards for IBM System/38 processors.

A Memorex spokesman said the firm will be offering memory boards for other IBM mid-range machines in the future. Memorex sold memory for IBM 370 processors in the late 1970s. Memorex announced the System/38 memory boards for the European market in February and has been selling them for several months.

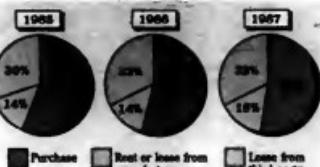
"Our research shows a large number of System/38 users to be upgrading their processors," said Greg Grothaus, Memorex's U.S. vice-president of the small systems group. "We're finding that users are installing IBM's Control Program Facility Re-

Continued on page 50

Data View

Mainframe system acquisition

Changes in method



INFORMATION PROVIDED BY DATAPRO RESEARCH CORP
CW CHART

Edge claims 11-MIPS mini

BY STANLEY GIBSON
CW STAFF

SCOTTSDALE, Ariz. — Edge Computer Corp. recently announced a dual-processor mainframe, the Edge 1200, which it claims can perform 11 million instructions per second (MIPS). In addition, the company announced the single-processor Edge 1100, which it rated at 6 MIPS.

Continued on page 51

Inside

- DG releases Rugged, Tempest versions of MV/15000 series. Page 50.
- Computervision announces 4-MIPS graphics workstation. Page 52.
- Eastek adds departmental image scanner to document processing system. Page 52.

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DEC foray

FROM PAGE 47

Shaffer, editor of the "Computer Letter" newsletter and head of Technologic Partners in New York. He reported that sales are strongest at Alliant and Convex.

Jack W. Hugan, president and CEO of Scientific Computer Systems in San Diego, Calif., said DEC will be a "formidable contender." But executives from Alliant and Convex claimed that they can beat DEC in the market because of their focused sales efforts, high-performance products and low prices.

By the time DEC enters the market, Convex's Palack said, Convex will have several hundred installations worldwide, a dominant position in specific market segments and many new products.

The situation is similar to the engineering workstation market led by Apollo Computer, Inc. and Sun Microsystems, Inc., Palack said. "Companies like IBM and DEC are actually playing catch-up...because they can't move fast enough," he said.

The recent strategic alliance between DEC and Cray, focusing on an interface between DEC's VAX minicomputers and Cray's X-MP supercomputers [CW, June 8], was a defensive move by DEC to buy time until it can enter the minisuper market, according to a report by researchers Piper, Jaffray & Hopwood, Inc. "The early successes of minisuper vendors like Alliant, Convex and Scientific Computer Systems have largely come at the expense of DEC," the report said.

Recent DEC alliances with Cray and Floating Point Systems are "part of a DEC stopgap strategy to slow the penetration of minisupers into the VAX installed base until DEC can respond with a minisuper of its own, probably within the next 12 to 18 months," the report said.

DG rolls out top guns for military

WASHINGTON, D.C. — At a recent convocation of U.S. Armed Forces computer users, Data General Corp. released the Rugged and Tempest versions of its 6-month-old MV/15000 computer series.

The Eclipse MV/15000R, called Rugged, and the

MV/15000T, or Tempest, series range in power from 2.9 million to 6.4 million instructions per second, the company said.

The Rugged models, which are said to meet military standards for withstanding vibration, shock, extreme temperatures, humidity and poor air quality,

cost from \$117,500 to \$284,000. The Tempest version, which is said to satisfy the Nicasim 5100A Tempest requirements, costs from \$177,000 to \$299,000. There are three models of each version.

DG also released a Tempest terminal, the \$2,805 Dasher

D461T; a \$30,000 Rugged 234M-byte removable-disk subsystem; and fiber-optic communications converters, priced at \$480 per pair, for connecting terminals or printers to the host.

Available operating systems include the time-sharing AOS/VS, the real-time AOS/RT32 and DG/UX, a standard AT&T Unix System V implementation.

Memorex

FROM PAGE 47

lease 8 because they want to improve response times, support additional system users and add new application programs. All these measures frequently require more main memory," he added.

The memory cards, called the 9000 series, reportedly are available in sizes of 1M, 2M and 4M bytes, priced at \$3,500 per megabyte. The cards are said to be compatible with the System/38 CPU, microcode and software. They can be transferred between different models of the System/38 family, from the Model 6 through Model 700.

Made for Memorex by Locom Corp., the boards are available immediately.

Godzilla

FROM PAGE 47

cent announcements an entry-level ASCII terminal priced at \$399, which is 42% below its previous low-end price of \$695. That undercut many competitors' prices, and IBM added that the 3151 display station can be used not only with IBM ASCII

hosts such as the Series/1 and RT Personal Computer but with various other hosts through Digital Equipment Corp. and Wyse emulation cartridges.

Making it still tougher on ASCII vendors whose customers might have "buy American" policies, IBM officials just happened to say that the 3151 is made entirely in the U.S. At least IBM did not mention that

many of the other ASCII vendors rely on off-shore manufacturing facilities in locations such as South Korea and Taiwan.

According to International Data Corp. (IDC), a Framingham, Mass.-based market research firm, IBM shipped 39,000 of the 1.27 million ASCII-type terminals sold in the U.S. in 1986. The market leader was Wyse, which shipped

281,000 terminals.

IDC Senior Research Analyst Diane Farrell called the ASCII market a slow growth area and said, "It's not likely that IBM can come in and grab a share of the market without hurting someone else." She described IBM's plans as a statement that IBM is getting tough.

IBM's move does not mean all ASCII terminal makers are

about to be crushed. Companies such as Wyse should be able to respond. Even some of the smaller makers may undercut or at least match IBM's price and claim functional superiority.

But put the little vendor whose slim profit margins are about to be squeezed again, when IBM charges into a customer site with a competitive price and the backing of a \$1 billion company.

What the customer should hope for is that enough alternative suppliers survive to keep the market competitive. But what they should be wary of is the first vendor to come calling with the statement, "IBM's presence legitimates our market." That has been said before, usually by vendors who would not be around to service their product because Godzilla was behind them.

Connolly is Computerworld's senior editor, systems & peripherals.

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To the longest list of text and graphics input support in desktop publishing comes even greater capability. Version 1.1 adds word processing interfaces for XyWrite, DisplayWrite III and IV and DCA files. There's graphic conversion for more than 500 graphics packages based on a dozen file formats, including Macintosh "PICT" and image files. Plus downloaded PostScript fonts, conversion of H-P Soft-fonts and support for Adobe screen fonts.

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Edge

FROM PAGE 47

Edge machines include a proprietary microprocessor design manufactured by National Semiconductor Corp. that emulates the Motorola Inc. 68000 microprocessor, according to Phillips W. Smith, chairman and CEO of Edge.

"People using the 68000 chip can move to Edge computers with virtually no porting of the software," Smith said.

High-and-machines

Value-added resellers and system integrators offering products using the 68000 microprocessor may want to resell the Edge systems as their high-end machines, Smith said. "We want resellers and integrators to see our products as ideal for applications where their customers need more than 6 MIPS at their fingertips," he said.

Smith likened the dual-processor's power to that of Digital Equipment Corp.'s VAX 8800. He said the new processors are ideal for applications involving more than 64 users, especially when the work requires graphics, imaging, communications and the use of relational data bases. The superminis are also well-suited for electrical and mechanical computer-aided design applications, Smith said.

The Edge 1200 contains 8M bytes of system memory, 337M bytes of hard-disk storage and Edge's GSX Unix operating system, which is based on AT&T's Unix System V, Release 2. The Edge 1200 is priced at about \$128,000; the single-processor Edge 1100 in the same configuration costs \$104,000. Edge said it will begin shipping the machines in July, with volume shipments beginning in September.

NEW PRODUCTS

Processors

CIE Systems, Inc. has expanded its family of 32-bit multi-user business computer systems with the addition of the CIES 680/550 high-end system and the CIES 680/50 en-

try-level system.

The CIES 680/550 features a 25-MHz Motorola, Inc. 68020 CPU, 45-msec 1M-byte memory chips and a high-speed 4M-byte small computer systems interface disk cache. The system can support 250 users. A standard configuration costs \$125,995.

The CIES 680/50 features a 68020 CPU running at 16.7 MHz and support for eight users. A basic configuration costs \$12,750.

CIE Systems, 2515 McCabe Way, Irvine, Calif. 92714.

CAD/CAM/CAE

Computervision Corp. has announced a graphics workstation

said to deliver 4 million instructions per second (MIPS) integer performance and 125K floating-point operations per second.

The system, called the Caddstation 34, includes a 64K-byte variable-address memory cache and high bandwidth, as well as a 64-bit processor-to-memory bus. It features Sun Microsystems, Inc.'s SunOS 3.2 release of the Unix operating system, the

vendor said.

A sample configuration includes the 4-MIPS CPU, 16M bytes of main memory, a ½-in. tape, a 515M-byte hard disk, an Ethernet interface and a color monitor. It costs \$90,400.

Computervision, 100 Crosby Drive, Bedford, Mass. 01730.

Data storage

Eastek Corp. has added a departmental image scanner to its optical disk-based document processing system.

The departmental scanner is said to scan up to 20 letter-size page/min. It processes paper sizes ranging from 3 by 5 in. to 8½ by 11 in. at a density of 200 dots/in. The document processing system is based on a distributed workstation environment and uses the Apollo Computer Corp. Domain local-area network.

The departmental image scanner option is priced at \$17,500.

Eastek, 10 Bloomfield Ave., Pine Brook, N.J. 07058.

Terminals

Teleray, a division of Research, Inc., has enhanced its Model 20-DHP to include type-ahead and return and enter features as well as a dual-port option that allows the terminal to operate and maintain sessions with two Hewlett-Packard Co. hosts or an HP and a Digital Equipment Corp. host or two DEC hosts.

Other 20-DHP enhancements include the addition of a soft-white 14-in. CRT and a simplified lock capability that is implemented with a single key-stroke in set-up mode. Standard features include 8-page display memory, bidirectional printer port, 80- or 132-col. display and separate VT220 emulation mode.

The 20-DHP is priced at \$1,295.

Teleray, Box 24064, Minneapolis, Minn. 55424.

Printers/Plotters

The Model 6704 400 line/min dot matrix line printer designed for use with IBM System/34, 36 and 38 minicomputers has been unveiled by Decision Data Computer Components Corp.

The Model 6704 is said to emulate the IBM 5256, 5224 or 5234 dot matrix line printers. Character resolution is 60 by 120 dots/in. in the draft mode and 90 by 180 dots/in. in the near-letter-quality mode, according to the vendor. Character and line spacing are variable. Print speed is 400 lines/min in the draft mode, 300 lines/min in the data processing mode and 175 lines/min in the near-letter-quality mode.

The Model 6704 printer is priced at \$6,995.

Decision Data, 400 Horsham Road, Horsham, Pa. 19044.



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IN DEPTH

Which data is which?

To get a workable picture of corporate data, MIS needs a framework for data engineering

BY SERGIO FAISOL

The discipline of data base engineering concerns itself with managing data as a corporate resource. Traditionally, development has concentrated on designing correct and efficient algorithms to collect and process data, thus making it available to the various parts of an organization.

Data base technology was born of the need to share data and make it easier to adapt to unforeseen applications. Data has been too closely tied to the applications for which it was originally defined. This flaw has created a number of problems, the least of which is wasting storage resources by filling it with redundant data.

Modern data base management systems provide increasing amounts of data independence — which is supposed to facilitate the separation of data from individual applications — in addition to backup and recovery facilities for on-line processing, teleprocessing, error-handling capabilities and even integrated fourth-generation languages.

With all of these facilities available, why do organizations still tie data so closely to applications, and why are they using a DBMS mostly for their fringe benefits — as sophisticated access methods?

The answer is that one of the most important prerequisites for sharing data is not and cannot be supplied by a DBMS. To identify areas with a potential for sharing, companies must analyze data from different applications — data that has been defined,

grouped and named in a variety of ways — identify those data elements that can be shown to be the same and then redefine them appropriately.

Better still, companies can design new data in such a way that it can be easily shared and reused. Only when such redesigns are made can a DBMS be used not just as an access method but also as a tool to manage data as a corporate resource.

Creating a corporatewide integrated data base environment is not an undertaking to be taken

careless and grandiose way.

On the other hand, a piece-meal bottom-up approach, which has been used for many years, usually leads to a nonintegrated environment.

Relating data to business

The discipline of data base engineering is concerned primarily with the knowledge and technologies required to define, group and relate data in a way that will promote sharing and reusability as much as possible.

Data analysis is a highly

the requirements level to the lowest and most basic form. Such abstractions should model data that reflects the fundamental nature of the business. It should also be easily understandable throughout the organization and lead to data structures that will minimize redundancy, optimize performance and facilitate evolution.

No single model can accomplish all of this, and attempts to develop one usually end up as expensive mistakes. The level of detail required to fine-tune one



lightly. It is not uncommon to find companies with tens of thousands of data elements, most of which are redundant and poorly defined. The sheer volume of data descriptions to be handled, not to mention issues related to the meaning of data and their relationships, make it virtually impossible to approach the overall problem at once in a top-down fashion.

Evidence of this can be readily seen in the failure of a number of expensive, long-term projects that perform data modeling in a

skilled task that requires a profound knowledge not only of a set of techniques but also of the underlying data as it relates to the operation of the business. Equally important is the way in which this knowledge is acquired, stored and communicated to people with backgrounds and experience that can vary from applications programmers to top-level managers.

In leading an organization into an integrated data base environment, data managers must create data abstractions from

individual application makes an overall picture unmanageable. In addition, the desire to prepare for unforeseen uses of data has led data analysts to define and include in their models many unnecessary data elements, which further complicate the issues and increase the amount of work involved.

What is needed is a framework that addresses the data knowledge needs of users, systems developers, data base designers and performance specialists. This framework should

Faissol is chief scientist at M. Breyer & Associates, Inc. in Palm Harbor, Fla., developer of the Prude data base engineering methodology.

- **Top-down vs. bottom-up compromise**
- **Data from a business point of view**
- **No single model will do**

IN DEPTH: A FRAMEWORK FOR DATA ENGINEERING

lend itself to evolutionary development while maintaining a clear overall view. Since most organizations already maintain a multitude of data definitions and existing systems that must be preserved, this framework must be able to handle existing data architectures and still be able to integrate them with new developments.

Built by evolution

A pure top-down approach to building an enterprise model is rarely possible any place else than in very small companies. The effort and time required for such a project usually discourages the potential beneficiaries — system development, user management and user operations — before the project is complete. Also adding to the problem is that substantial time must be spent resolving conflicts about data definitions in a changing environment. Very often, after all this effort, users see no direct benefit arising from the project.

The best approach in data modeling is to "divide and conquer" but to do so with strong discipline and control to prevent the "conquered territories" from becoming isolated islands with different cultures and languages. In other words, each major effort, which may include one or more systems, needs to be carefully integrated with the existing model. Conflict resolution must be done at this time in a nondisruptive way.

As a result of the integration of the model with a new system, changes to existing models may be necessary. This can be achieved without disruption only if the boundaries between logical and physical are sharply maintained so that adjustments to logical models can be made without affecting the physical implementation and vice versa.

Engineering framework

The framework for data base engineering presents a multilevel view of data. This framework is composed of the following four interrelated data base models, each of which addresses a different aspect of the data base (see chart above):

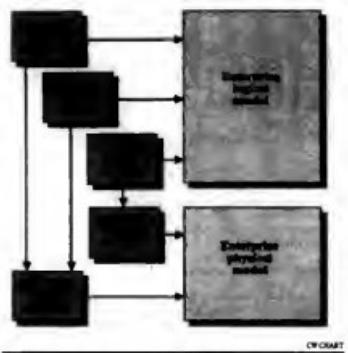
- Enterprise logical data base model.
- Application logical data base model.
- Enterprise physical data base model.
- Application physical data base model.

The logical models rely on the concept of objects and are totally independent of any implementation detail, including access paths. The physical models take into account the type of DBMS used, or the lack of one, and represent actual files and records.

This approach allows the design of proper logical models without disrupting existing data structures no matter how they

A framework for data base engineering

The physical models and logical models represent data differently; together they provide a full picture of corporate data



pose the enterprise physical model. Performance and security considerations could dictate such rearrangements, which need not necessarily be normalized.

Application physical data base model. The purpose of this model is to provide program designers with the physical data structures necessary for their programs. This model may be just a subset of the enterprise physical model that refers to the particular application, or it may depart substantially from it to the extent that it depends on the DBMS or file access methods used.

Objects

Business facts and events are the backbone of the logical models in data base engineering. They are represented by data abstractions called objects, which are conceptual representations of the facts and events required to operate and manage an enterprise. Objects may be as tangible as a customer, an employee or a vendor or as intangible as a debt, a credit or a transaction. The key point is that objects are used to represent the enterprise and are unique to a specific business or type of business. They do not exist on their own merit; they must have a legitimate bearing on the organization.

Objects are represented by groups of data elements used to define and describe those objects. It is, however, impossible and unnecessary to record every potentially conceivable piece of

detail. This fact/event approach, coupled with normalization techniques, is the key to achieving a stable model that promotes sharing and allows for unforeseen uses of data.

An object instance is defined as a data abstraction that records an individual fact or event. For example, the fact that John Doe is an employee at the First Alien Bank is recorded by one instance of the object "Employee." The bank will probably record the same data about all its employees. An object is defined as the description of all such instances, that is, it describes the properties recorded about all employees. These properties are defined as data elements, each of which specifies a more elementary fact recorded about employees.

Objects may be as concrete or as abstract as data analysis makes them in order to represent facts or events of interest. The identification of objects is the single most important task in data base engineering, since it has an impact that reaches far beyond the scope of information systems development. The following example from the banking business illustrates this point.

Historically, the first and foremost product offered by banks was the custody of funds. The Checking Account abstraction was created as a means to keep track of relevant data. In the early days of banking, this data was maintained as a manual file that contained such elements as the current balance, the date opened, the customer's name and address, deposits, withdrawals and so on. The checking account would be a final product.

In fact, this is how most banks implemented their first computerized checking account systems — with a single sequential tape file. Even if the concepts of third normal form were applied to such a file, it could have been designed with two normalized records, one for the data elements that occurred only once and the other for the variable deposit/withdrawal transactions (see chart at left).

The problem with this approach became apparent when banks started to offer other products such as savings accounts, loans and insurance. It was further complicated by joint accounts. New objects (Savings Account, Loan Account and so on) that could not communicate with each other were created, along with large amounts of redundant data and all the associated problems.

When the banks realized they should maintain a Customer object as distinct from the Checking Account object, they found that the effort to perform this conversion was enormous. Not only did the information systems need to be redesigned, but functional units also had to be

level of detail, possibly with different relationships.

Enterprise physical data base model. The purpose of this model is to provide data base designers with the freedom to choose the best technology for each major application — a DBMS, disk, tape or even many small files — and keep that technology independent from the logical models.

The enterprise physical model is a global view of all physical

Data modeling

One bank found that identifying "checking account" as an object in a data model made for an inflexible data base; keeping the customer information separate fit the business more closely

Checking and customer data as one object

Account #	Name	Address	Balance	Date opened
Account #	Trans. #	Date	Amount	

Checking account object

Separate objects for checking and customer

Customer #	Name	Address	Balance	Date opened
Customer #	Account #	Date opened	Account type	

Customer object

Customer #	Balance			
Account #	Trans. #	Date	Amount	

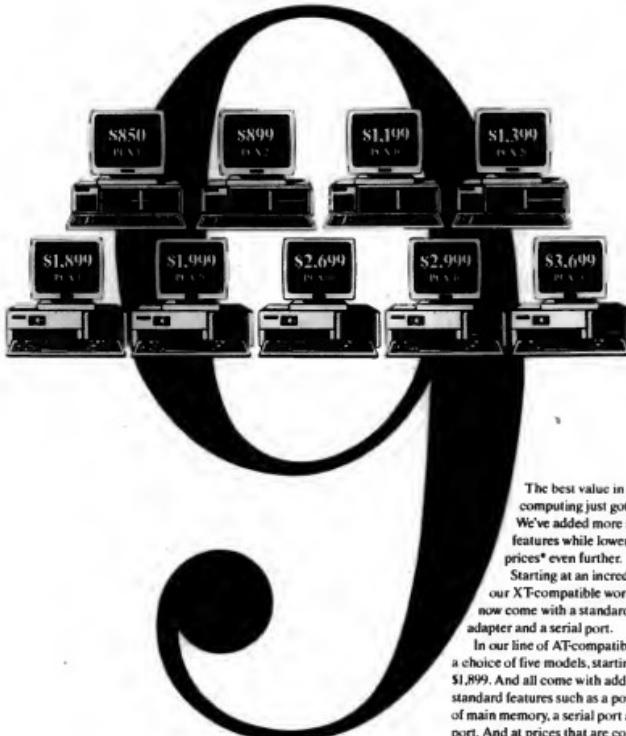
Checking account object

files, records and data bases used to implement the objects in the enterprise logical model. It reflects the technology used for implementation at any given time. Objects of the enterprise physical model may be regrouped or split in different ways to com-

plete an object. Furthermore, it is only necessary to be concerned with certain facts and events of interest to the business. Objects are designed around these facts or events, regardless of physical implementation issues, and at the proper lev-

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Rules of normalization

It might be argued that the rules of normalization would separate a Customer object from a Checking Account object, but this might not always be true, depending on the existing functional dependencies among the data elements involved. If only the name and address — the account holder's — could be associated with a checking account and no other products (such as insurance) were of interest, name and address would be functionally dependent on the Checking Account number, and there would be no need for a Customer object. This was the approach taken by

AS A RESULT of the integration of the model with a new system, changes to existing models may be necessary. This can be achieved without disruption only if the boundaries between logical and physical are sharply maintained so that adjustments to logical models can be made without affecting the physical implementation.

most banks in the past.

Ideally, new objects should be created only when the enterprise enters a new area of business and by those in charge of defining that business (the realm of enterprise engineering). However, in practice, systems analysis is often confronted with identifying objects when developing a

new system for an existing business area or when documenting an existing system.

This fact/event-oriented approach to data abstractions is less ambiguous than the entity-oriented approach commonly used. The major difference between these two approaches is not in the form of representation of the model but rather in the

semantic difference between objects and entities.

While entities represent things that exist in the real world, objects are more general, in that they can be any convenient data abstraction known to the business. In the entity-oriented approach, two kinds of data are defined: attributes of entities and relationships among entities. Records are created by first identifying groups of data that represent things that exist in the real world. These will constitute the entities. Then, relationships are identified and named. Some relationships, such as "many-to-many" or those containing additional attributes, also become records.

The point here is that there is no effective criteria to discriminate between those things in the real world that are entities and those that are not. For example, suppose we define Orders and Products as entities. A many-to-many relationship between these two containing the additional attribute Quantity would have to be represented as a nonentity record, which might call a Shipment. Which intrinsic property of a Product makes it an entity, while a Shipment is seen as a relationship?

This type of ambiguity finds itself in most data bases and, further, clouds the process of entity identification. Furthermore, since different user groups may view the same real-world item either as an entity or as a relationship, an additional dimension is added to the data modeler's task — that of integrating different views into one global model.

A checking account is another example that would hardly qualify as an entity and would probably be labeled as a relationship between Customers and Transactions, unless we force the rules of entity definition.

In fact, in the entity-oriented approach, all major business events would fall into the category of relationships, which are harder to characterize, especially for users. The preceding discussion does not imply that all objects are regarded in the same way. There are many different kinds of objects, some of which, certainly, are more important than others and therefore will be dealt with at earlier phases of design.

First things first

The point to be stressed in this discussion is that the identification of the objects to be represented in the logical data base model is not only of crucial importance to the development of information systems but also has bearing on the basic operation of the business.

The rules of normalization are important for a proper design of data structures and must be strictly adhered to, but these rules can only be applied after the fundamental data abstractions — the objects — have been identified and semantically defined.

Although data management is required to have an overall understanding of all of the data, such data abstractions are not defined as a result of a caprice on data management's part. They are created by those who are most knowledgeable in that particular area of the business — the users — and systems analysts working together.

The fact/event-oriented data modeling approach leads to an easier and less ambiguous way to create data abstractions and, most importantly, facilitates both the processes of object identification and integration. *

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Putting MIS in focus

Focus means different things to different people. To a photographer, it has to do with adjusting a lens. To an astronomer, it is the point at which a planetary orbit begins. To a physician, it is where the center of an infection is located. In business, focus means choosing the most important things to concentrate on — and then concentrating on them.

Lack of focus can be disastrous. In the late 1960s there was a company called Viatron. Viatron was the prototype for the go-go high-tech start-ups of a decade later. It set out to build a terminal to rent for the then-unheard-of price of \$39 per month. It was well on its way to that goal when management decided to pursue minicomputers and digital watches as well. Chapter 11 was right behind.

I have seen many examples of achieving focus first-hand. As director of strategic planning for a minicomputer firm, I found it easy to get agreement on the concept of focus. It was not difficult to get agreement on areas for focus. The hard part was getting

Continued on page 64

GTE tries incremental backup

Selective copying reduces risk, labor needs, storage requirements

BY JEFFRY BEELER
CW STAFF

SACRAMENTO, Calif. — For years, the problem of how to back up mainframe disk files has created a classic bind for managers of GTE Data Services, Inc.'s computing site here.

On the one hand, the combined capacity of the data center's direct-access storage devices is growing by about 40% per year, according to GTE Senior Systems Analyst Diane Koenig. Each night, it has to copy the complete contents of its 99 IBM 3380s and 3380Es to its IBM 3480 cartridge-tape subsystems.

On the other hand, the window within which the site is supposed to complete the backup of its files is rapidly shrinking. "We used to start our backup at 8 or 9 p.m., when we took our on-line systems down, and were able to continue the process until about 6 a.m.," Koenig recalls.

But lately, steady growth in the company's end-user and on-line application base has forced the center to restrict its data-processor activities to a window between midnight and 4 a.m., Koenig says.

In addition, focus means choosing the most important things to concentrate on — and then concentrating on them.

more data and less time in which to back it up than ever before.

Now, however, the facility is trying to extricate itself from its growing predicament by redefining its approach to data backup. Starting last week, the data center officially became a practitioner of incremental backup.

As a result of the development, Koenig and her colleagues are now copying only the subset of the contents, she says.

Included in the subset are the data sets for their IBM TSO users, production batch activities and test batch functions. In a

Continued on page 64

CIM may spawn new industry

BY DAVID A. LUDLUM
CW STAFF

NEW YORK — Computer-integrated manufacturing (CIM) systems may allow firms to perform manufacturing as a service for various industrial customers, an associate secretary of the U.S. Department of Commerce told a gathering of information systems executives here recently.

Reprogrammable CIM systems might even allow such firms to offer manufacturing services to companies in different industries, said D. Bruce Merrifield, associate secretary of commerce for productivity, technology and innovation.

Addressing a June 23 executive forum on Competitiveness Through Technology held by The Diebold Research Programs, Merrifield cited CIM as a technology that could enhance the competitiveness of U.S. industry.

Productivity measures
Merrifield focused his remarks on advocating an array of societal changes intended to accommodate improvements in productivity.

These changes included a comprehensive program of "computer-aided education" to improve elementary and secondary schools, new incentives for innovation — such as easier patent

Continued on page 63

New Fannie Mae chief stresses ease of use

BY DAVID A. LUDLUM
CW STAFF

Samuel A. Alward will have an advantage in trying to follow the increasingly widespread corporate maxim that information systems managers should keep close to their users.

As the new executive vice-president for technology at the Federal National Mortgage Association, better known as Fannie Mae, Alward is both a user and an MIS manager, overseeing mortgage administration as well as information services.

"Being a provider and user is becoming less curious in my experience. Some of the Wall Street firms are going this



Samuel A. Alward

route," says Alward, a former executive vice-president for finance and administration at the New York Stock Exchange.

Looking at Fannie Mae, Al-

ward says he sees parallels with the stock exchange. "A lot of it is automated, but if we look at what can be done, it provides an exciting opportunity to make the whole thing automated," he says.

Alward describes his goal as "bringing together the different elements with the theme of making it efficient and easy to do business" with the mortgage agency.

Alward will continue the roll-out of Fannie Mae's once-troubled Laser system, which mortgage lenders use to file monthly updates on the status of the loans that they have sold to Fannie Mae but continue to service.

Continued on page 63

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LOCAL HAPPENINGS**JULY**

Women's Progress as Leaders: Reality or Illusion? San Francisco, July 8, 5:30 p.m. — Contact: Association for Women in Computing, Bay Area Chapter, Suite 1044, 41 Sutter St., San Francisco, Calif. 94104.

Hewlett-Packard Top-tech Users Club. Rockville, Md. July 8, 9:00 a.m. — Contact: Bruce Baxter, Internal Revenue Service, 1111 Constitution Ave. N.W., Washington, D.C. 20224.

Programming in Postscript and Rethinking Applications Design. Boston, July 13 — Contact: The Boston Computer Society, One Center Plaza, Boston, Mass. 02108.

Data Base Design Tailored to DB2. Philadelphia, July 14, 9:30 a.m. — Contact: Delaware Valley DB2 Users Group, Suite 505, 3650 Silverstone Road, Wilmington, Del. 19810.

System/38 Communications Hardware, Software and Features. Fairfield, N.J. July 16, 3:30 p.m. — Contact: Northern Systems Thirty-Eight Systems, Inc., New Jersey Chapter, P.O. Box 1272, West Caldwell, N.J. 07007.

Graphics Programming Under the OS/2 Windows Presentation Manager. Boston, July 20 — Contact: The Boston Computer Society, One Center Plaza, Boston, Mass. 02108.

Data Administration Management Association. Chicago, July 21, 5:30-9 p.m. — Contact: Patricia Cupoli, Northrop Corp., Building 3555, 600 Hicks Road, Rolling Meadows, Ill. 60008.

AUGUST

Computer Consulting vs. Permanent Employment. San Francisco, Aug. 5, 5:30 p.m. — Contact: Association for Women in Computing, Bay Area Chapter, Suite 1044, 41 Sutter St., San Francisco, Calif. 94104.

CALENDAR**JULY 12-18**

Fourth Annual Information Center Conference and Exposition. New Orleans, July 12-16 — Contact: Wengarten Publications, Inc., 38 Chauncy St., Boston, Mass. 02111.

IBM Users/DDEC Users Computer Security Conferences. Philadelphia, July 13-14 — Contact: Computer Security Institute, 360 Church St., Northboro, Mass. 01532.

Computer-Aided Engineering: The Many Faces of

CAE. San Francisco, July 13-14 — Contact: Frost & Sullivan, Inc., 106 Fulton St., New York, N.Y. 10038.

AAAI-87, The Sixth National Conference of the American Association for Artificial Intelligence. Seattle, July 13-15 — Contact: AAAI-87, 445 Burges Drive, Menlo Park, Calif. 94025.

Chief Information Officer: Training for Profit. New York, July 14-15 — Contact: William Simonyi, The Yankee Group, 200 Portland St., Boston, Mass. 02114.

JULY 19-25

AM/FM International Conference X. Snowmass, Colo. *Continued on page 64*

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Fannie Mae

FROM PAGE 51

The system is replacing three older systems based on different Fannie Mae programs for buying mortgages. Lenders ship most of the updates by tape to Fannie Mae.

The Aggregate Exception System, the largest of the com-

ponents that Laser is replacing, was converted to Laser Oct. 1, 1986 after a widely publicized plague of 1,500 bugs in its Cobol code delayed the start-up for 19 months and doubled Laser's estimated cost to \$50 million. That component serves about 1,600 lenders, most of whom are mortgage bankers who service roughly two million loans.

Fannie Mae expects to imple-

ment the second component of Laser, replacing its Summary and Participation Reporting System, with a pilot group of about 100 lenders in September, according to Alward.

Eventually, Fannie Mae will handle about 1,300 lenders, generally thrift and savings-and-loan institutions, that service about 500,000 loans. Full-scale use is expected early next year.

The third component, replacing the Mortgage Backed Securities system, is for about 800 lenders that service about 500,000 loans. Its start-up is scheduled for the fall of 1988.

Fannie Mae also operates Mornet, a communications network for the lenders that has bulletin boards and applications that have been enhanced to allow them to edit data and deliver it to

Fannie Mae via microcomputer. "That's really exciting, because it's been a boon to small bankers. All it takes is one personal computer to talk to Fannie Mae," says Marty Mitchell, a spokeswoman for the agency.

Alward is also responsible for Fannie Mae Software Systems, a division of the association that develops and sells mortgage banking software.

Alward succeeds William A. Dawson, a former executive vice-president of Gerard Bank in Philadelphia who joined Fannie Mae in February 1985, a month before the initial deadline for getting the first component of Laser running.

Dawson's drive to meet the October 1986 start-up date involved 12-hour programming shifts seven days a week. He has since resigned to pursue other career opportunities, according to Mitchell.

Alward's mission

Alward joined Fannie Mae in November 1986 as president and chief executive of the National Mortgage Exchange Interim Corp., a division that studies the feasibility of starting an exchange for mortgage-backed securities.

"My mission was to see if there was support out in the market for that," Alward says. "With other initiatives going on, another entry probably didn't make good sense. I recommended we not proceed."

Previously, Alward was vice-president for Seaboard Coastline Railroad and president of its computer services subsidiary, Cybernetics & Systems Inc. He graduated from the U.S. Military Academy in West Point, N.Y., and was a marketing manager for IBM.

CIM

FROM PAGE 51

proval of patents for defense-related inventions — and greater use of cooperative research and development programs.

Merrifield also advocated several steps intended to remove barriers to American competitiveness, such as relaxing the 73-year-old Clayton Antitrust Act, loosening industrial regulations, and lowering the cost of capital.

He justified such moves on the basis of the global competition facing U.S. industry.

"If it's pro-competition in the global context, it's OK," Merrifield said. "It's going to happen with us or without us. It better be with us."

Merrifield also noted that the U.S. has advantages in competing globally, including the country's advanced technology, industrial infrastructure, wealth of capital and entrepreneurial culture.



Continued from page 62

July 20-23 — Contact: Barbara Emery, Automated Mapping/Facilities Management International, Suite 820, 8775 E. Orchard Road, Englewood, Colo. 80111.

The Federal Desktop Publishing Conference and Product Showcase, Washington, D.C., July 20-23 — Contact: FDPSC coordinator, 38251-S, George Mason Drive, Falls Church, Va. 22041.

The Desktop Publishing Conference, Arlington, Va., July 21-22 — Contact: The ILS Group, Inc., 7485 Denim Court, Annandale, Va. 22003.

National Fiscom: Financial and Computer Automation Conference, New York, July 22-23 — Contact: Jim Min, H.A. Bruno, Inc., 333 Sylvan Ave., Englewood Cliffs, N.J. 07632.

Microtrends '87, New York, July 22-24 — Contact: International Communications Industries Association, 3150 Spring St., Fairfax, Va. 22031.

JULY 26-AUG. 1

Computer Associates International, Inc. Annual User Conference, Orlando.

do, Fla., July 26-31 — Contact: Barbara Peacock, Computer Associates, 711 Stewart Ave., Garden City, N.Y. 11530.

1987 Summer Computer Simulation Conference, Montreal, July 27-30 — Contact: The Society for Computer Simulation, P.O. Box 17900, San Diego, Calif. 92117.

Stigraph '87 — The Fourteenth Annual Conference on Computer Graphics and Interactive Techniques, Anaheim, Calif., July 27-31 — Contact: Stigraph '87, Commerce Management, 300 Buckfield Associates, Suite 600, 111 E. Wacker Drive, Chicago, IL 60601.

AUG. 2-8

Annual Remittance and Document Processing Forum, San Francisco, Aug. 2-5 — Contact: Recognition Technologies Users Association, P.O. Box 2016, Manchester Center, Vt. 05255.

25th Annual Conference of the Urban and Regional Information Systems Association, Fort Lauderdale, Fla., Aug. 2-6 — Contact: URISA, 319 S. St. S.E., Washington, D.C. 20003.

MIS in focus

CONTINUED FROM PAGE 51

tting people who saw themselves "losing" to give up their pet projects. They would bring in a sales representative to promise a 600-system order if we did X. Of course, nobody ever ordered 600 systems, even when we pulled out all the stops. The order went to a firm that had been doing X for years, had made it the corporate focus and finally had it right.

Focus is just as important for computer manufacturers. It's just as important for MIS executives. Nobody has all things to all people. One can choose to do a few things well or many things poorly. In 1987 of 100 cases, doing a few things well is better for all concerned.

That's nice in theory, but how do you choose the few things that are worth doing well?

Using CSFs to your advantage

One way is via critical success factors, or CSFs. CSFs were first put forth publicly in a 1979 *Harvard Business Review* article by John Rockart. The basic CSF concept is simple, almost trivial: Figure out the most important measures of success, figure out what you have to do to succeed by those measures and focus on them. If CSFs have been properly defined, proper priorities will follow.

The hard part is defining CSFs properly. One may have 100 current applications, any of which could cause a crisis if it broke. Does this mean the MIS head should worry about all 100? Of course not. A shop big enough to have 100 critical applications has more than one manager. Put Harry in charge of applications.

Then the MIS head has one CSF in this area — making sure Harry does his job.

As Jerry Kanter and Richard Dooley pointed out in a 1986 Babson College study, this may call for fewer direct reports to the MIS head. While this reduction must not create too many management levels, it may be the only way a chief information officer can focus fully on what is truly important.

This year's critical issues

The real CSFs for most MIS heads this year relate to the organization's business. They have to do with making a contribution to the company by improving its competitiveness, responsiveness and product quality; by decreasing its capital investment needs in manufacturing and distribution; and by enabling its executives to make better and faster decisions.

They include keeping MIS staffers happy and productive. They reflect concern for control, audit, stability and maintenance of on-going applications, some of which are mundane.

The specifics vary with each organization's industry, culture, strengths, weaknesses and position of its top information systems executive. But CSFs exist in every case.

MIS chiefs should ask themselves, "What are my critical success factors? What can I do, in my job, to make a contribution to this organization?" Having done so, they must translate these needs into personal CSFs. The result will be good for both the employee and the employer.

Malisch is associate professor of computer science at the Boston College School of Management.



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in the allotted window of time. The result was that the computing site was occasionally forced to conduct the next day's processing activities with only one copy of some of its key data sets. If a disaster had befallen its master disk packs, critical data might have been irretrievably lost.

Thanks to good fortune thus far, the lapses in the company's backup procedures never coincided with any serious accidents. "But we definitely had some exposures," Marlin recalls.

Now that it has converted to incremental backup, the firm no longer faces the danger of having to operate with only one copy of its key data. The reason is that the change in backup techniques has greatly cut the amount of data the organization has to duplicate at night and thus has virtually guaranteed its ability to finish the task on time.

Cuts costs, work load

In embracing incremental backup, GTE also expects to be able to cut the number of tapes it has to mount during the evening by 80%, Koenig says. Previously, the data center averaged 200 to 300 tape mounts per night.

The reduction in tape mounting requirements, in turn, promises to help the computing facility trim its personnel costs, which are already "very high and are rapidly rising," Koenig says.

Another benefit of selectively backing up data is that the tactic will shrink to 2,000 the number of tape cartridges the site has to maintain to copy its critical files, she adds. In the past, the processing center's tape library typically contained about 9,000 such cartridges.

COMPUTER INDUSTRY

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INSIGHT



Clinton Wilder

Catching up with the past

Like baseball's All-Star break, the three-day Fourth of July weekend provides an appropriate midpoint to look back on events of the first half of the computer industry's 1987 season. Hopefully, a recap and assessment of some of the major developments in the first six months will help prepare us for what may be in store in the second half. But of course, in this business, you never know.

When the shark bites... The biggest industry event of the year so far has been Computer Associates International, Inc.'s surprise acquisition of Uccel Corp. Standing the independent software industry on its ear during the week of Condex/Spring '87, the brothers Wang visited their fast-growing firm to the top of the next list. If the \$800 million deal is approved later this summer, Computer Associates could arguably become the industry's first software conglomerate.

Is that good or bad for users? Opinions vary widely, and only time will tell how well Computer Associates lives up to its promise of continued product support and updates. But one certainty cannot change that the Garden City, N.Y., software massive has no experience in digesting acquired companies.

From a business standpoint, however, the software industry suffers when one of its best success stories of the past two years disappears under the wings of a larger partner. Uccel's Chief Executive Officer Gregory Liedmandt had done a superb job of refocusing the Dallas vendor with a savvy combination of sell-offs and buy-outs; even Wall Street was impressed. While Liedmandt and his colleagues obviously reaped handsome financial rewards from the buy-out, the industry itself, in losing a strong independent player, is poorer for it.

P.S. Do I love you? At least three entire industries — microcomputers, add-on per-

Continued on page 67

More mergers in networking industry

DCA to purchase LAN manufacturer Fox Research

BY ELISABETH HORWITT
CW STAFF

ALPHARETTA, Ga. — As part of its strategic direction of offering a complete communications product line, Digital Communications Associates, Inc. (DCA) agreed last week to acquire local-area network (LAN) manufacturer Fox Research, Inc., a subsidiary of Fox Technology, for \$10 million in cash and debt assumption.

Fox's "entry level-oriented LAN" would strengthen DCA's ability to meet the needs of "independent end users who are not necessarily attached to a corporate host," said William Hiller,

DCA director of communications systems. Whereas DCA's flagship product line, the firm's micro-computer board, "provides host-data access and involves day-to-day MIS support," the company is now concentrating on end user-to-end user communications products, he explained. The acquisition of micro communications software company Microsoft, Inc. last week was another move in that direction. DCA is also internally developing products "several to linking remote end-user locations with no mainframe host," Hiller said.

DCA has no plans to integrate its firm line with Fox's 10-NET family of IBM Personal Computer LAN products, Hiller said. This departs from a precedent set by LAN vendors Under-

Continued on page 67

Microm to acquire Spectrum for \$25M

BY JAMES A. MARTIN
CW STAFF

SIMI VALLEY, Calif. — Microm Systems, Inc. said last week it plans to acquire Spectrum Digital Corp., a T1 multiplexer vendor, for a total of \$25 million in cash and stock.

The merger will bring greater T1 capabilities to Microm and will give Spectrum Digital the resources of a larger company to strengthen its presence in the hotly competitive T1 market, officials said. Spectrum Digital, based in Herndon, Va., will be operated as an independent subsidiary of Microm.

"The merger removes a cloud that any small high-tech company has about their financial viability," said Joseph T. Pisano, Spectrum Digital's president. "Many large customers hesitate to do business with smaller companies for that reason."

"That type of consolidation has been exemplified by several recent deals in which larger companies acquired T1 technology from smaller T1 vendors.

Among these were Digital Communications Associates, Inc.'s acquisition of Collective Network Corp. and IBM's OEM agreement with Network Equipment Technologies Corp.

Expands network products
Microm, like many data communications equipment makers, is seeking to expand its networking product offerings through acquisitions. In 1985, Microm acquired Interstar, Inc., a local-area network maker based in Bos-

ton, Mass.

Industry observers say they believe the Spectrum Digital acquisition will have little impact on the two companies' products. Spectrum Digital and Microm previously had an OEM agreement under which Microm repackaged and resold Spectrum Digital products.

Microm's acquisition of Spec-

trum Digital is a good move but belated, according to Phil Litwin, an analyst with L.F. Rothschild, Unterberg Towbin.

"The T1 market is still strong, but they've missed a lot of its growth already," Litwin said. "In addition, Spectrum Digital doesn't have a large market presence, and Microm's range of T1 multiplexer products is still not as broad as that of some competitors."

Paradyne Corp., a Microm competitor in certain markets, also has an OEM agreement with Spectrum Digital, although none of the companies involved believe this will create conflict.

"We have exclusive manufacturing rights to the T1 multiplexer in the U.S. and nonexclusive distribution rights," said Ron Stein, manager of telecommunications marketing for Paradyne in Largo, Fla.

"We have always had a good relationship with Microm, so I don't see any effects from the merger," he added.

Waltham
• Computer Memories and Sysco Corp. are the dominant Waltham, Mass. firms. Page 68
• Micro/Netwark design engineer Christopher Thorpe. Page 64.

IBM's new European unit goal: PBX market

BY ANNET KORNBLUM
CW STAFF

PARIS — In a move designed to help hawk its telecommunications wares in Europe, IBM recently announced the creation of a unit to develop and manufacture voice- and data-switching systems adapted to the European market.

Called Integrated Services Switching Systems (ISSS), the organization will be based in the England at IBM UK Holdings Ltd.'s Hawkhurst facility, according to the company, and will be head-

ed by Frank Osienski, currently a vice-president of IBM-owned Rola Corp.

"ISSS will concern the Europeanization of products from Rola," explained a spokesman for IBM Europe in Paris. "Up to now, there have been no switching systems of Rola effectively up for sale in Europe."

Equipment destined to be linked to the public networks in Europe requires official approval from the government-controlled telecommunications authorities. ISSS will implement the necessary

Continued on page 67

IPL recovers with memory products

BY ALAN J. RYAN
CW STAFF

WALTHAM, Mass. — After being squeezed out of the plug-compatible mainframe market by mammoth IBM, a new focus and new products have helped bring some life back to once-dying IPL Systems, Inc.

The company, now marketing memory products for the IBM System/36 Model D and System/38 minicomputers, has reported six consecutive profitable quarters.

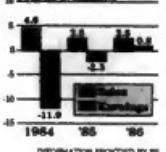
However, while its figures are back in the black, many of IPL's profits still stem from the IBM 4300-compatible CPU

product line; the company is trying to move beyond this niche.

IPL aims to soon be 100% dependent on sales and earnings from the memory products, but of the \$1.09 million reported in sales last quarter, approximately \$750,000 came from the sale of CPUs, according to President and Chief Executive Officer Robert W. Norton. "Even though we are not currently investing any money into the mainframe business, we continue to sell mainframe computers on an OEM basis," Norton says.

Norton says the company's mainframe business will likely end in mid-1988 with the expiration of a major federal govern-

IPL's bumpy road
After hitting rock bottom, IPL is climbing back; the firm reported a \$4.19-million profit on \$1.1 billion in sales in its first quarter.



some of its early success selling

Continued on page 69

Concurrent restructures, slims staff

BY ALAN ALPER
CW STAFF

HOLMDEL, N.J. — Concurrent Computer Corp. last week laid off approximately 2% of its domestic work force as part of a modest restructuring of its corporate resources.

The layoffs cut across the firm's 1,650 Monmouth County, N.J.-based work force, according to a company spokesman, affecting employees in marketing, service and administration. The minicomputer maker also said that it is consolidating its nine New Jersey locations into three facilities.

Concurrent's service operation, which was dispersed throughout several facilities, will now be located with manufacturing at its Ocean Port facility. The firm is also moving its corporate administration staff from Holmdel to Tinton Falls, where sales and marketing are located. The consolidation is expected to be completed during the next six months, the spokesman said.

In a related move, the firm named Joseph Rechner, its vice-president of customer service, to the newly created position of vice-president of operations. Rechner is responsible for customer service and manufacturing in his new post.

The moves come as Concurrent attempts to rebound from a soft economy that has affected demand for its and other minicomputer companies' products. Although Concurrent earned \$2.4 million in the third quarter, compared with a \$7.24-million loss in the comparable period last year, its nine-month results reflect the sluggish times. Concurrent earned \$4.6 million during the last nine months, off 5% from the same period last year.

DEC settles DSI copyright suit

BY CLINTON WILDER
CW STAFF

MAYNARD, Mass. — Digital Equipment Corp. won an out-of-court victory last week over a Lanham, Md.-based third-party maintenance firm that allegedly used unlicensed diagnostic software from DEC to service VAX minicomputers.

DEC agreed to drop its 1986 copyright infringement lawsuit against DSI Computer Services, Inc. [CW, Nov. 18, 1986] and received an undisclosed cash payment from DSI. According to DEC, DSI admitted its unlicensed use of the software. In addition, DSI agreed with DEC that it is not currently using the software in question and will not do so in the future.

When the suit was filed, DSI had characterized it as a "DEC sales tactic" to discredit DSI in the eyes of its third-party VAX maintenance customers, which are primarily federal government accounts. But DEC viewed the matter strictly as a case of copyright protection.

Maxtor purchase steps up move on PC market

BY JAMES A. MARTIN
CW STAFF

SAN JOSE, Calif. — Maxtor Corp. said last week it has acquired Storage Dimensions, Inc., a data storage subsystem distributor in the IBM Personal Computer market, for an undisclosed amount.

The acquisition "reflects Maxtor's commitment to compete actively in the high-capacity segment of the PC marketplace, which involves applications tools and distribution channels that differ from Maxtor's traditional OEM business," a Maxtor spokesman said.

Storage Dimensions, based in Los Gat-

os, Calif., is a privately held company that purchases Maxtor's 5½-in. Winchester and optical disk drives. It incorporates the drives, along with its own operating system utility software, into its family of data storage subsystems for distribution to value-added channels.

Independent subsidiary

Storage Dimensions reportedly is to be included in Maxtor's Storage Systems Group, which includes U.S. Design Corp., a firm Maxtor acquired two months ago. Both companies will be operated as independent subsidiaries, Maxtor said.

Analysts viewed Maxtor's recent ac-

quisition as a positive move for the firm. "Maxtor's been getting closer to its end users and their applications, and this is just another step in that direction," said Jim Morrissey, president for Dataquest, Inc. in San Jose, Calif.

The strategy behind the acquisition was to open up new avenues for distribution, not to create new products, the company said.

"A key element in our strategy is using our existing channels of distribution while further expanding our distribution through our subsidiaries," said Bob Teal, Maxtor's senior vice-president of marketing.



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IBM's unit goal

CONTINUED FROM PAGE 65

sary design changes of telecommunications equipment manufactured in the U.S. so that it meets European requirements, the spokesman said.

Effective resource allocation

"This move will enable IBM to focus its telecommunications development and manufacturing resources more effectively in the European marketplace," asserted Michel Armstrong, president and director general of IBM Europe, in a prepared statement.

IBM indicated in September 1986 that a reorganization of its European opera-

tions at that time was partly motivated by a will to improve its European telecommunications business.

IBM already sells its 1750 model analog private branch exchange in five European countries. In addition, Rolm provides British users with its Automatic Call Distributor, which is used for distributing a high volume of incoming calls to agents, such as for ticket reservations.

Looking to the future

Observers noted that the ISSS emphasis on developing products integrating voice and data that can be connected to Europe's public networks will permit IBM to target the future market for integrated Services Digital Networks (ISDN).

ISDN is being championed by several

European telecommunications authorities, with major pilot projects under way in France and West Germany.

Separately, IBM announced plans last week to create a value-added network services venture in France sometime this summer.

The firm is to be owned jointly by two French banking groups, Paribas and Crédit Agricole, and a French software and services company named Sema-Mera.

With the launch, IBM scores a major victory in its efforts to penetrate the European value-added network services market.

The consortium has been awaiting government approval of the project since February 1986.

Catching up

CONTINUED FROM PAGE 65

rial vendors and micro software — will be sorting out the potential damage/ market opportunities of the IBM Personal System/2 for months to come.

In peripherals, an industry already littered with ailing players will certainly shake out further. In micro software, the inevitable evolution of the Big Three into mainframe territory will be hastened. Among the closer markets, there will be plenty of market opportunity for the swift and the smart — but beware the mighty Bluesky force. Computer Computer Corp.'s Rod Canion is far from out there in *Business Week*'s cover jive.

Workstation warfare. With the heavy artillery of price cuts and MIPS ratings, the battle wages. What else would one expect in an area that covers Unix, computer-aided software engineering, computer-integrated manufacturing, expert systems development and networking? The guys to watch carefully are in Maynard, Mass. — this could be the market that keeps Digital Equipment Corp. riding high.

Raging bulls. With the Dow Jones industrial average roaring again and the shine returning to high tech in the investment world, initial public offerings are back in vogue. From minicomputers to desktop publishing software, dozens of vendors took the public plunge in the first half of the year. Even microcomputer retail chains are getting into the act. So where is that recession those economists have been predicting?

Wider is *Computerworld's* senior editor, computer industry.

DCA

CONTINUED FROM PAGE 65

man-Bass, Inc. and Novell, Inc., which acquired micro-to-mainframe companies during the past couple of years.

Earlier this year, Ungermann-Bass announced a network gateway that supports micro-to-mainframe software from its wholly owned subsidiary, Linkware Corp. And Novell announced at Comdex/Spring '87 that its subsidiary CXI, Inc., a terminal emulation software now supports Novell's Netware.

Fox Research, a Dayton, Ohio, company with 1986 revenues of approximately \$6.5 million, is the latest in a series of acquisitions by DCA. DCA made three acquisitions in 1986: Port Communications, Inc., one of its competitors in the IBM PC terminal emulation board market; T1 switch vendor Cohesive Network Corp.; and Microsoft.

While Fox has concentrated on the international market, "avoiding the national market which has been dominated by the 3Com Corp.-Novell battle," DCA hopes to boost 10-NET sales in the U.S. through its own distribution channels, Hiller said.

The agreement between DCA and Fox calls for the payment of cash and the assumption of liabilities of approximately \$10 million by DCA, with a contingent "earn-out" of up to an additional \$6.5 million. The latter provision is based on the future financial performance of the Fox Research Division of DCA during the one-year period following the closing.



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IPL

CONTINUED FROM PAGE 65

to Control Data Corp., which funded IPL's start-up to provide IBM plug-compatible CPUs after Cambridge Memories closed its doors.

But the hard times hit in recent years. In 1983, IPL reported a loss of \$4.25 million on sales of \$9.9 million. The following year, the company lost \$11.9 million on sales of just \$4.6 million. In 1985, the firm reported earnings of \$385,000 in its fourth quarter but lost \$2.3 million for the year on sales of \$2.5 million.

Today, the company's remaining 24 employees have much excess space in IPL's 55,000-square-foot facility, which is located in an industrial park in Waltham, a city west of Boston.

On the upswing

The current workers are leading IPL in its new direction, and for now, the strategy seems to be working. IPL returned to the black in 1986, earning \$800,000 on sales of \$2.5 million. In its first quarter of fiscal 1987, IPL reported modest net profits of \$419,000, or 8 cents per share—a 38% increase over the previous year's first-quarter results. Some \$255,000 of first-quarter sales were from the memory products, a 180% increase over the preceding quarter.

"Our plan is: As the mainframe revenues phase out as expected, the revenue from the new products will phase in and take over," Norton says. "That presents a very severe short-term management problem to make sure that the transition is done effectively."

To sell its product line, IPL goes through the dealer, broker and value-added reseller channels and also conducts telemarketing. The company maintains no outside sales force. IPL does have in-house manufacturing for the CPUs but subcontracts the memory products to an outside manufacturing house. "You don't have to go through the pain of dismissing people if business has a negative trend, nor do you have the possibility of being stuck with a large amount of real estate that you can't use because of a downward trend in the business," Norton says of the outside manufacturing.

On the positive side, he adds, the outside manufacturers can more easily accommodate a spike in production needs.

IPL plans to use its memory products to gain name recognition in the new marketplace before branching out to other IBM-compatible peripheral products, the CEO says.

Norton says he remains optimistic about the company's future success and that the price/performance of the memory products will keep IPL in business. He says IPL can provide the memory for the Systems/38 at a 50% savings over IBM's pricing. "We have a unique design that allows us to keep the cost very low, but the storage of data is identical to the way IBM and other developers do it," he says.

Armed with a heavy reminder of the company's past, the IPL president is humble. "We haven't lost sight of the big job in front of us," Norton says. "If you go into a new marketplace, you have to convince the customer that the organization he's dealing with is going to be around for a long time to provide service and support to the product. If you try to do that with red ink on your financials, the customer would just stay away from you."

EXECUTIVE CORNER

The board of directors of Hogan Systems, Inc. recently announced a series of corporate changes.

George L. McTavish, president and chief executive officer, assumed the role of CEO and chairman of the board. McTavish succeeds Gregor G. Peterson.

Peterson remains a director of the company.

Richard B. Aldridge, executive vice-president, was named president and chief operating officer. Patrie J. Jorge was promoted to senior vice-president of field operations and will report directly to Aldridge. Hogan also announced that James J. Murphy has joined the company as senior vice-president in the community banking group. Prior to joining Hogan Systems, Murphy spent 24 years with IBM.

Mitel Corp. announced that President and CEO Anthony F. Griffiths will become chairman of the company. David Golden, the current chairman, will remain as a director of Mitel and chairman of two of its subsidiaries, Mitel Datacom and Trillium Telephones Systems, Inc.

Bert Novak has been appointed to the post of president of the McDonnell Douglas Field Service Co. Novak had been director of quality assurance and technical support for Cupertino, Calif.-based McDonnell Douglas Network Systems Co., which operates the Tymnet worldwide public and private telecommunications networks.

Mentor Graphics Corp. Chairman and CEO Thomas Bruggere announced the appointments of Gerard Langeler as president and chief operating officer and David Mofenbeier as executive vice-president. Langeler was previously executive vice-president and chief operating officer.

NICKELS & DIMES

Floating Point Systems, Inc., announced revenue for the second quarter ended April 30 of \$23.5 million, compared with \$21.3 million the previous year. The company also reported a net loss of \$2.1 million, or 40 cents per share, compared with a net loss of \$1.5 million, or 18 cents per share, in the like period a year earlier.

American Software, Inc., announced revenue for the year ended April 30 of \$46.7 million, up 22% from the \$38.3 million reported last year. Profits were \$8.8 million, or 85 cents per share, compared with \$5.9 million, or 59 cents per share, in the comparable period a year ago.

Revenue for the fourth quarter was \$12.8 million, compared with \$10.3 million the previous year. Profits were \$2.1 million, or 20 cents per share, compared with \$1.9 million, or 18 cents per share, in

the comparable period a year ago.

Gandalf Technologies, Inc., reported revenue for the third quarter ended May 2 of \$23 million, compared with \$26.3 million one year ago. Profits were \$1.7 million, or 16 cents per share, a 74% increase from the \$962,000, or 10 cents per share, in the like period last year.

PC's Limited/Dell Computer Corp., announced record results for the first quarter of its 1988 fiscal year. The company earned \$1.9 million on net sales of \$33.4 million in the quarter ended April 30. This compares with net earnings of \$2.2 million and net sales of \$69.4 million for the full fiscal year ended Jan. 31.

As a percentage of sales, net earnings were 5.8% for the first quarter of 1988, compared with 3.1% for fiscal 1987.

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EMPLOYMENT TODAY

Good managers are hard to find

Manufacturers seek MIS directors, senior-level programmer/analysts

BY DALE F. FARMER
SPECIAL TO CW


With the advent of computer-aided design and manufacturing (CAD/CAM), manufacturing resource planning and robotics, manufacturers are rivaling service industry companies in their implementation of automation. Data processing professionals, especially those with manufacturing experience, are finding more opportunities in this environment.

In 1982, service industry companies accounted for 71% of total U.S. DP hiring, according to Dunhill Personnel Systems, Inc. That figure dropped to 64% in 1986. Manufacturers accounted for 29% of the DP hiring in 1982 and 35% in 1986, the firm says.

The DP environment in manufacturing companies offers unique opportunities and challenges. Professionals hired by companies just starting to automate face the challenge of developing a system that is acceptable to the line personnel. They must overcome objections from current employees who want to maintain the status quo. They must handle criticism of the new system diplomatically and pre-

sent the advantages provided by automation.

Besides the drive to automate, the growth of many manufacturing organizations is creating openings in senior and management-level DP positions. Candidates for these levels must possess a good performance record and be willing to adapt to a new environment. Two manufacturing companies may make similar products, but their manufacturing processes will differ. In some cases, the processes may differ within a single company that makes the same product in various locations.

DP goals in manufacturing differ from those of DP in service companies. In banking, insurance or retail, for example, DP professionals must be concerned with providing information or answers to customers in manufacturing, they must use technology to create an actual product that can be sold. This distinction is small, since both groups are concerned with satisfying a customer's needs. However, manufacturing managers focus more on cost control, efficiency and accuracy in

getting the product out the door and into the customer's hands.

"You're constantly being pushed, because making the product makes the dollars," says Henry Buckley, DP manager for Rowe Furniture Co. in Salem, Va. "There is a lot of pressure, because nothing must impact the manufacturing process. You have to be responsive to any type of crisis which may require

cating the right candidate for senior-level positions difficult. Experienced candidates are harder to find for the positions of senior programmer/analyst, data base manager and MIS director, manufacturers say.

"Most of our applicants have a financial background," Buckley says. "Our experience, so far, is that we get our best results by hiring our people directly out of college and training them in manufacturing concepts."

The key to success in manufacturing for the DP professional is to be able to understand the terminology and procedures and translate them into viable DP alternatives. Aided by grants from computer manufacturers, a number of educational organizations, including national colleges and universities, are now offering programs in this area.

Manufacturers say they are particularly interested in hiring programmer/analysts with a high degree of communication skills. Most of the new programming for manufacturing requires a working knowledge of the manufacturing pattern, so the programmer/analyst must work closely with people on the shop floor.

While companies are also looking for systems and applications programmers, they are

less eager to hire systems analysts because they are relying on the programmer/analyst to perform much of that function.

Making the switch

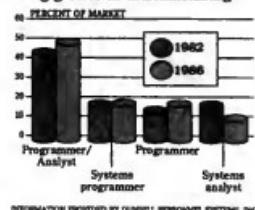
DP professionals searching for positions in manufacturing may find better opportunities if they aim their search at familiar industries. Candidates with a background in higher mathematics and engineering possess a definite advantage, especially in robotics and CAD/CAM environments.

Professionals who choose to make the switch from service industries to manufacturing will probably be rewarded with higher salaries. In all job categories, the average salaries in 1986 for manufacturing positions were higher than those in the service industries, according to Dunhill.

A typical programmer/analyst made \$30,000 last year in manufacturing companies, compared with \$29,000 in service companies, Dunhill says. Manufacturing programmers earned \$32,000, while those in service industries earned just less than \$27,000. Systems analysts collected \$35,500 from manufacturing employers, while service analysts received just less than \$34,000. Systems programmers were paid \$39,000, bettering service system programmers' salaries of just less than \$37,000.

Farrar is a security administrator for Financial Technologies, Inc. in Chantilly, Va.

Hiring growth in manufacturing



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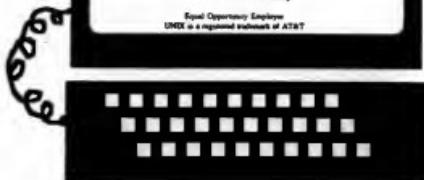
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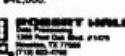
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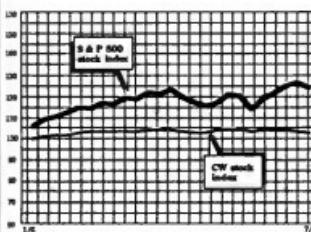
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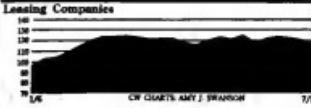
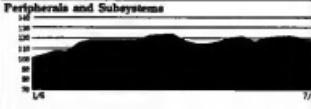
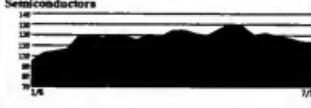
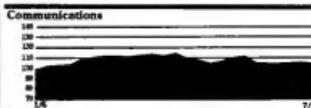
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STOCK TRADING INDEX



<i>Indices</i>	<i>Last Week</i>	<i>This Week</i>
Communications	105.7	103.9
Computer Systems	129.3	126.8
Software & DP Services	136.7	133.1
Semiconductors	114.2	113.3
Peripherals & Subsystems	119.8	117.0
Leasing Companies	120.7	117.6
Composite Index	103.7	103.3
S&P 500 Index	126.7	124.2



Computerworld Stock Trading Summary

CLOSING PRICE: Wednesday, July 1, 2009

Semiconductors

Communications and Network Services

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Computer System

ALLIAN COMPUTER SYSTEMS				IMAGATE TECHNOLOGY				
ALUMINUM COMPUTER SYSTEMS	17	16	26.00	-3.3	-7.4	10	33.30	
ALUMINUM COMPUTER SYSTEMS	17	16	12.43	-0.8	+4.0	TEC INC	7	3
ALUMINUM COMPUTER SYSTEMS	17	16	12.43	-0.8	+4.0	TEC INC	7	3
AMICO COMPUTER SYSTEMS	16	15	16.00	-5.1	-5.1	TECHNOLOGIC SYSTEMS INC	10	3
AMICO COMPUTER SYSTEMS	16	15	16.00	-5.1	-5.1	TECHNOLOGIC SYSTEMS INC	10	3
APPLE COMPUTER INC	23	15	40.00	-9.8	-1.2	WIRE TECH	16	13
APPLE COMPUTER INC	23	15	40.00	-9.8	-1.2	WIRE TECH	16	13
BROTHMAN	8	5	3.25	-0.8	-1.6	ZENITH COMP	10	20
BROTHMAN	8	5	3.25	-0.8	-1.6	ZENITH COMP	10	20
BRUTON & CO INC	8	5	3.25	-0.8	-1.6	ZENITH COMP	10	20

Learning Communities

FEDERAL DRAFT STS-PRO							
GAARDER INC.	23	18	19.75	-0.8			+8.5
GAARDER INC. DES.	43	21	19.75	-0.8			+3.1
HEWLETT-Packard Co.	87	38	20.13	-3.0			-4.8
HONEYWELL, INC.	85	58	85.00	-1.8			-0.1
					G-T-C PRICE IS THE LOW-PRICE OF 40 OF 5P.M. DRIFT IN G-T-C MULTIPLE-DRIFT		

Rodime plunges

Drive maker's stock drops 48% amid massive investor sell-off

Investors have battered the U.S.-listed stock of Scottish disk drive vendor Rodime PLC after the firm announced 10 days ago that it expects to report its fourth straight losing quarter.

In the four days of trading ended Wednesday, Rodime's over-the-counter stock plummeted 48%, from an opening price of 9½ bid on Friday, June 26 to a close of 4½. That plunge included single-day percentage drops of 23% on June 26 and 29% — the largest over-the-counter market loss of the day — on June 29.

Rodime's stock debacle is the latest example of massive investor sell-off when a company reverses itself on earlier predictions of improved business.

In April, Kodime announced that its quarter ended June 30 would show a significant revenue increase from the previous quarter. However, the company's revised recent assessment noted that reported sales would actually fall 1.8%.

Other recent industry examples of similar financial faux pas — with comparable stock market reactions — include Floating Point Systems, Inc. and Daisy Systems Corp.

CLINTON WILDER

CLINTON WILDER

DEC adds bus licenses

Two vendors receive VAXBI bus authorization

BY ELISABETH HORWITT
CW STAFF

Two Transmission Control Protocol/Internet Protocol (TCP/IP) networking companies have joined the elite ranks of third-party vendors with licenses to develop products for the VAXBI bus, Digital Equipment Corp.'s newest bus architecture.

Excalan, Inc., in San Jose, Calif., announced last week that it had obtained the license to the VAXBI bus. Excalan's competitor, Micom-Interlan, Inc., in Boxboro, Mass., made a comparable announcement two weeks ago.

Both companies already offer intelligent CCITT 802.3 Ethernet controllers that allow DEC VAX and Qbus systems to communicate with other vendors' systems using TCP/IP.

DEC reportedly has been frustrating third-party vendors by making it difficult for the vendors to obtain a VAXBI bus license. Approximately 30 companies are currently said to have licenses.

The license allows the networking vendors to develop controllers that link directly to the VAX 8000 bus without the need for a Qbus adapter, according to Micom-Interlan, a subsidiary of Micom Systems, Inc.

This should significantly reduce the cost of such products, the vendor added.

"The VAXBI bus license is a natural transition of our relationship with DEC," said Micom-Interlan President Michael Barker. "We offer one of two DEC-

supported Decnet-Ethernet controllers for the IBM Personal Computers."

TCP/IP provides a link between DEC products and non-DEC computers that do not support the firm's Decnet networking system, according to Barker. DEC depends on third-party vendors to provide TCP/IP connectivity for its hosts because "it is committed to Decnet."

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and to migration to Open Systems Interconnect," Barker said.

DEC spokesmen cited OSI as the company's strategy for offering multivendor compatibility; however, while TCP/IP is mature and supported by a wide range of vendors, the OSI standard is currently still under development.

Micom-Interlan reportedly plans to ship its intelligent VAXBI bus Ethernet controller, to be named NP800, in the first quarter of 1988. Excalan cited a mid-1988 shipping date for its VAXBI bus Ethernet boards and software.

Pricing information was not available from either of the companies.

grams will not need to be modified to run in Jugger's windows.

While most existing applications are expected to run unaltered under Jugger, some minor modifications may be required to ensure compatibility, especially with communications software.

Limiteditions
The one thing that Jugger does not do very well is in ownership of certain system resources, like the serial ports," said one of the developers briefed by Apple. "If you have some serial activity going on, you don't really have any control."

"That is why it is not true multitasking: because the operating system does not do the resource arbitration," the developer said.

The lack of resource arbitration may pose a threat to the compatibility of communications software, a key application for a multitasking environment, the developer added. "Right now, there is a lot of concern that, given the current release, if I am the author of any software that does

SQL data base link crosses system gaps

BY CHARLES BABCOCK
CW STAFF

MENLO PARK, Calif. — Gupta Technologies, Inc. is expected to release this month a distributed networking product that can tie together different vendors' SQL-based data base management systems on different-size machines.

SQ/L net employs IBM's LU6.2 application-to-application communications standard, giving it two standards with which to work, company President Umang Gupta said last week. The IBM SQL standard allows a user at a personal computer to

formulate a query using another Gupta product, SQL Base.

The LU6.2 standard allows the query to be transmitted to the proper data base management system, where it will extract data in the same manner it would if it were running against its local data base.

"This is the first program that uses Advanced Program-to-Program Communications [APPC] to directly communicate with a remote data base. The host becomes like an extension of the PC data base," said Richard Finkelstein, manager of the Codd and Date Consulting Group in Chicago.

The initial release of SQL Net supports data distribution between SQL Base and IBM's DB2 under the mainframe MVS environment, or CICS/VS, Gupta said.

The \$50,000 network product is made of two components. SQL Host runs on an IBM mainframe as a CICS transaction program. SQL Gateway uses an IBM Personal Computer on any IBM Netbios-compatible local-area network as a gateway to mainframe- and minicomputer-based SQL databases.

Each gateway PC must have an IBM Synchronous Data Link Control board connection to the mainframe via a leased or dial-up line or an IBM Token-Ring connection via an IBM 3720 or 3725 communications processor or a 3174/1L terminal controller. IBM's APPC/PC package is required on the PC gateway machine.

Unisys offers 5G-byte disk drives

BY JAMES CONNOLLY
CW STAFF

BLUE BELL, Pa. — Unisys Corp. last week announced a quadrupling of on-line storage capabilities for mainframes made by the former Burroughs Corp., as the company introduced a 50-Gbyte disk drive comparable to the IBM 3380 model.

The Unisys 9494-24 is intended to provide users with greater storage capacity at a lower cost per megabyte than is available with the 2-year-old Unisys 9494-12. That machine, which has a formatted capacity of 868M bytes and an unformatted capacity of 1.2G bytes, re-

mains available, according to Harry Goldberg, Unisys program manager for disk products. Both drives are manufactured at Unisys' plant in Clara, Calif., perhaps the only difference being the differences among IBM 3380 models.

The 9494-24 was designed with use with Unisys A series, V series and B7900 mainframes.

Thin-film heads

Like the earlier model, the 9494-24 uses thin-film heads. The new model features two head-disk assemblies (HDA) per drive instead of one HDA and provides double the capacity with each HDA, Goldberg said. The new drive features a 17-msec average access time, com-

pared with a 16-msec access time in the single-capacity drive. Goldberg said the time difference is negligible and is consistent with the differences among IBM 3380 models.

He said the older 9494-12 with a 9389 storage controller, a 9399 cache, 9399-10 and eight drives costs \$355,300. A new 9494-24, 9494-24 configuration, consisting of a 9389, a 9399-E with an integrated drive and one additional drive, costs \$286,090. The 9494-E and integrated drive costs \$129,150 and can support up to three more drives, which each cost \$98,140. The 9494-24 is available immediately, Goldberg said.

Plas, you have a chance of corrupting the machine or crashing the set of tasks that is running," a developer said. With the PMMU version, however, "even if one application crashes, all the other applications continue to run."

With booted breadth
Users are looking forward to the release of Jugger. "Everybody is anticipating Jugger. A lot of users are going to like it," said Rick Richardson, national director of technology development for Arthur Young in New York. "If it says anything, it says buy more memory," Richardson said. Other users interviewed last week agreed.

Richardson, who describes the Jugger concept as a "nuc add-in," is skeptical about the need for multitasking, viewing it as helpful only for background communications or for recalculating large spreadsheets.

The appeal of Jugger for Richardson is a hope-for improvement in the ability to cut and paste data.

Juggler

FROM PAGE 1

applications that provide communications capability may have problems running under Jugger.

Although Jugger should arrive well before OS/2, Apple has yet to announce the product. "We don't preannounce versions of our operating system," an Apple official said.

But a demonstration of Jugger given to Computerworld points out the ease with which users can open multiple applications and share data through cut-and-paste functions while applications share the same screen.

And, like the latest version of Microsoft Windows, Jugger uses overlapping, rather than tiled, windows. These features are a major enhancement to the Macintosh's ability to exchange data and switch among applications. In addition, Macintoshes equipped with Microsoft's MS-DOS coprocessor boards will be able to run MS-DOS applications in a window. Most MS-DOS pro-

grams will not need to be modified to run in Jugger's windows.

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Limiteditions
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Symphony option targets tech users

Lotus's Measure works within older tool; firm also inks pact with HP

BY ALAN J. RYAN
CW STAFF

CAMBRIDGE, Mass. — Lotus Development Corp. last week announced a software package aimed at engineers and scientists who work with the company's Symphony software.

Measure for Symphony was designed to work within Symphony to collect data from measurement instruments and transfer it directly into the spreadsheet for analysis, storage and graphic display. The program's features and functions are basically the same as those of Measure for 1-2-3, according to a company spokeswoman.

The instruments are connected to a personal computer via one of three interfaces included in the software, which are the IEEE 488, RS-232C and analog-to-digital plug-in board inter-

faces. Measure takes the data from the instruments and plugs it directly into Symphony or 1-2-3, where it can be graphed or incorporated into a document or plugged into the spreadsheet, Lotus said.

Users control data

The user is responsible for sending the information to the correct area in the spreadsheet and uses instructions via macros to do so. The user can also manipulate the data as it comes into those areas.

The Measure 488 Interface allows users to streamline the process of collecting data by connecting Symphony to IEEE 488-compatible instruments, including multimeters and digital oscilloscopes.

The RS-232 Interface reportedly provides simplex, half-duplex and full-duplex communica-

tions with any RS-232C-compatible hardware such as lab balances and bar-code scanners.

The Measure Analog-to-Digital Interface works with a plug-in data acquisition board that can be directly connected to sensors such as thermocouples, strain gauges and more, the vendor said.

Measure for Symphony runs on the IBM Personal Computer, PC XT and AT, the Hewlett-Packard Co. Vectra C and the Compaq Computer Corp. Portables. It is scheduled to be available in the middle of this month for \$495.

In other announcements, HP and Lotus said last week they have signed an agreement under which HP will distribute and support Measure for 1-2-3 and Measure for Symphony on a worldwide basis as part of its product line.

INSIDE LINES

Toot sweet. Dan & Bradstreet is expected to announce this week the sale of the assets of its D&B Computing Services subsidiary to Thomson S.A. of France [CW, June 15]. Sources say Thomson will mold D&B into its Princeton, N.J., subsidiary, United Systems Software & Services, and rename the operation Mxit Software International. Thomson has agreed to keep the merged company in D&B's Weston, Conn., offices until the lease on its headquarters building is up. Thomson has also agreed to remain in Fairfield County, Conn., for the foreseeable future. Apparently, negotiations became bogged down on a variety of issues, not the least of which was a Thomson requirement that 75% of D&B's employees sign employment contracts.

On the right TAC. Lotus this week is scheduled to announce a new version of The Application Connection (TAC), a range of software products that allow IBM PCs to extract data from IBM 370 host applications and have that data translated into popular PC formats. The new version is expected to allow more applications to exchange data, including a connection to IBM's DB2.

A word to the wise. In a help-wanted ad last week in the *Wall Street Journal*, IBM said it is seeking experienced attorneys to work on patent and intellectual property matters. Specific technical areas in which IBM is seeking patent-law experience are signal processing, computer systems, computer programming, digital electronic circuitry, microcomputer devices and communications.

Will it play in Peoria? At the upcoming American Association for Artificial Intelligence show in Seattle, Symbolics, Inc. is slated to introduce a board-based computer using the Intel 80386 microprocessor for use in Symbolics' AI workstations. Symbolics says the board will enable the workstation to run Unix and Microsoft's MS-DOS, along with the library of applications written for those operating systems. Symbolics is scheduled to roll out a software package that will enable applications developed on its machines to be ported to 80386-based PCs.

We expect to announce our intent to introduce, Unisys has plans to dive into the 80386 waters sometime in late October or early November. Last week, the company announced its "intent to introduce" an 80386-based PC that will reportedly support Unix and Microsoft's XENIX for multiuser environments as well as Microsoft's MS-DOS and MS OS/2 for single-user applications. Pricing was not available. Unisys also said it will provide OS/2 to users of its PC/ITs, PC/Micro ITs and future Unisys systems when the operating system becomes available early next year.

Just don't mention the computer. Trintex, the IBM and Sears joint venture into the ill-fated videotex market [CW, May 25], has come up with a name for its forthcoming service that makes no mention of home computers or videotex. From now on, it will be called "Prodigy," an interactive personal service." As a Trintex spokesman put it, "It's a low-tech name that the average person can relate to."

Looking to be protected. A high-ranking Ashton-Tate told *Computerworld* recently that his firm was looking into using tools from non-Microsoft third-party vendors that would allow DOS 3.1 to exploit the large memory of 80386-based machines. Even if Ashton-Tate takes this approach, users should still expect an OS/2 version of DOS.

Someday it will all be clear. A noted computer analyst recently met with IBM officials, who suggested that users interested in running IBM's OS/2 Extended Edition buy only IBM machines. The IBMers blamed that version of OS/2 to some IBM software and IBM add-on boards that just don't run on clones. In addition, OS/2 Extended Edition does not run under the Presentation Manager, OS/2's graphics user interface. There are two theories behind this, the analyst said. One is that IBM does not want to have to wait for the Presentation Manager to ship before having OS/2 Extended Edition. Another is that IBM began developing OS/2 Extended Edition before agreeing to use Microsoft Windows as the foundation for the Presentation Manager.

Judge Greene

FROM PAGE 1

services, Greene called the Justice Department's support for state-by-state review of the competitive situation a "larceny."

Greene also said he was "astonished" that the Justice Department wants to relinquish its job of determining whether the Bell holding companies have subsidized their unregulated business ventures with telephone ratepayer funds.

During the third day of hearings, which concerned information services such as videotex and on-line data bases, Greene was skeptical about assertions that the FCC's rules for Open Network Architecture (ONA) will prevent the Bell holding companies from giving other information service providers low-quality or overpriced access to the local network.

"Are you talking about the FCC regulations that aren't in effect yet?" Greene asked its department's lawyer, Nancy Garrison. ONA plans must be filed

with the FCC in 1988 and are not to be approved until 1989 or thereafter.

To have a decision about lifting the information services restriction on the assurance that there will be ONA plans in 1988 or 1989, Greene said, "seems to be a pretty thin reed. Do you have something more than that?"

ARE YOU talking about the FCC regulations that aren't in effect yet?"

JUDGE HAROLD H. GREENE
U.S. DISTRICT COURT

But Greene — who showed keen interest in the French telephone authority's role in the Minitel videotex system — seemed open to some limited role for the Bell holding companies in the information services industry [CW, June 29].

For example, Greene asked vendors

whether the court should allow the Bell companies to offer transmission services integrated with information services but not the editorial content.

Donald E. Ward, attorney for the on-line data base companies and others, said he could be too difficult to distinguish between transmission and content.

While many information service companies opposed entry of the Bell holding companies into their turf, the Videotext Industry Association supported removal of the restriction on information services.

Howard Liberman, an attorney for the videotex association, said the industry is not afraid of competition with the Bell holding companies if the FCC implements the appropriate safeguards.

Industry analysts have suggested that struggling videotex companies will be rescued by alliances with the Bell holding companies, which can profit from the increased traffic on their networks.

"The key issue," Liberman said, "is how will the revenues be shared?"

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